

# TEST REPORT

## CERTIFICATE OF CONFORMITY

**Standard:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
**Report No.:** RFCDVB-WTW-P24010023B-6  
**FCC ID:** TX2-RTL8822CE  
**Product:** 802.11a/b/g/n/ac RTL8822CE Combo module  
**Brand:** Realtek  
**Model No.:** RTL8822CE  
**Received Date:** 2024/11/27  
**Test Date:** 2024/12/9 ~ 2024/12/24  
**Issued Date:** 2025/1/10  
**Applicant:** Realtek Semiconductor Corp.  
**Address:** No. 2, Innovation Road II, Hsinchu Science Park, Hsinchu, Taiwan, 300  
**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Lin Kou Laboratories  
**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan  
**Test Location:** No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan  
**FCC Registration /** 788550 / TW0003  
**Designation Number:**

Approved by: \_\_\_\_\_

Jeremy Lin

Jeremy Lin / Project Engineer

, Date: \_\_\_\_\_

2025/1/10

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Prepared by : Gina Liu / Specialist

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## Release Control Record

| Issue No.               | Description       | Date Issued |
|-------------------------|-------------------|-------------|
| RFCDVB-WTW-P24010023B-6 | Original release. | 2025/1/10   |

## 1 Certificate

**Product:** 802.11a/b/g/n/ac RTL8822CE Combo module

**Brand:** Realtek

**Test Model:** RTL8822CE

**Sample Status:** Engineering sample

**Applicant:** Realtek Semiconductor Corp.

**Test Date:** 2024/12/9 ~ 2024/12/24

**Standard:** 47 CFR FCC Part 15, Subpart C (Section 15.247)

**Measurement** ANSI C63.10-2013

**procedure:** KDB 558074 D01 15.247 Meas Guidance v05r02

KDB 662911 D01 Multiple Transmitter Output v02r01

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

## 2 Summary of Test Results

| 47 CFR FCC Part 15, Subpart C (Section 15.247) |                                 |        |                                                    |
|------------------------------------------------|---------------------------------|--------|----------------------------------------------------|
| Standard / Clause                              | Test Item                       | Result | Remark                                             |
| 15.247(b)                                      | RF Output Power                 | Pass   | Meet the requirement of limit.                     |
| 15.247(e)                                      | Power Spectral Density          | N/A    | Refer to Note                                      |
| 15.247(a)(2)                                   | 6 dB Bandwidth                  | N/A    | Refer to Note                                      |
| 15.247(d)                                      | Conducted Out of Band Emissions | N/A    | Refer to Note                                      |
| 15.207                                         | AC Power Conducted Emissions    | Pass   | Minimum passing margin is -12.29 dB at 0.33000 MHz |
| 15.205 /<br>15.209 /<br>15.247(d)              | Unwanted Emissions below 1 GHz  | Pass   | Minimum passing margin is -7.7 dB at 30.00 MHz     |
| 15.205 /<br>15.209 /<br>15.247(d)              | Unwanted Emissions above 1 GHz  | Pass   | Minimum passing margin is -1.0 dB at 2483.50 MHz   |
| 15.203                                         | Antenna Requirement             | Pass   | No antenna connector is used.                      |

### Notes:

1. Only test item of Output Power, AC Power Conducted Emissions and Unwanted Emissions were performed for this report. Other testing data please refer to module report No.: RF180816E04 (Brand: Realtek, Model: RTL8822CE).
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| Parameter                      | Specification   | Uncertainty (±) |
|--------------------------------|-----------------|-----------------|
| RF Output Power                | -               | 1.371 dB        |
| AC Power Conducted Emissions   | 9 kHz ~ 30 MHz  | 2.90 dB         |
| Unwanted Emissions below 1 GHz | 9 kHz ~ 30 MHz  | 3.59 dB         |
|                                | 30 MHz ~ 1 GHz  | 3.6 dB          |
| Unwanted Emissions above 1 GHz | 1 GHz ~ 18 GHz  | 2.29 dB         |
|                                | 18 GHz ~ 40 GHz | 2.29 dB         |

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

### 2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

### 3 General Information

#### 3.1 General Description

|                       |                                                                                                |
|-----------------------|------------------------------------------------------------------------------------------------|
| Product               | 802.11a/b/g/n/ac RTL8822CE Combo module                                                        |
| Brand                 | Realtek                                                                                        |
| Test Model            | RTL8822CE                                                                                      |
| Status of EUT         | Engineering sample                                                                             |
| Power Supply Rating   | End-product:<br>19.0 Vdc (from adapter)<br>10.8 Vdc (from battery)                             |
| Modulation Type       | CCK, DQPSK, DBPSK for DSSS<br>64QAM, 16QAM, QPSK, BPSK for OFDM<br>256QAM for OFDM in VHT mode |
| Modulation Technology | DSSS, OFDM                                                                                     |
| Transfer Rate         | Up to 400 Mbps                                                                                 |
| Operating Frequency   | 2.412 GHz ~ 2.472 GHz                                                                          |
| Number of Channel     | 802.11b, 802.11g, 802.11n (HT20), VHT20:13<br>802.11n (HT40), VHT40:9                          |
| Output Power          | 366.914 mW (25.65 dBm)                                                                         |

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report to module report No.: RF180816E04 (Brand: Realtek, Model: RTL8822CE). The difference compared with original report are adding End-product. Therefore, only Output Power, AC Power Conducted Emission and Radiated Emissions were verified and recorded in this report. AC Power Conducted Emission and Radiated Emission tests according to module report radiated emission worst channel, and Conducted power were re-test.
2. The EUT is authorized for use in specific End-product. Please refer to below for more details.

| Product  | Brand | Model    |
|----------|-------|----------|
| Notebook | Getac | S510-103 |

3. The End-product contains following accessory devices.

| Item          | Brand   | Model          | Specification                                                                                                                                 |
|---------------|---------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Battery       | Getac   | BP3S2P3450P-04 | Power Rating : Rating: 10.8Vdc , 6600mAh, 72Wh<br>Typical Capacity: 6900mAh, 75Wh                                                             |
| AC Adapter    | Chicony | A17-120P1A     | AC Input : 100-240 Vac ; 50-60 Hz ; 1.8 A<br>DC Output : 19.0Vdc ; 6.32A, 120.0W<br>DC Output Cable : 1.75M / 1 core<br>AC Power Cord : 1.75M |
| WLAN Module 1 | Intel   | AX211NGW       | -                                                                                                                                             |
| WLAN Module 2 | Realtek | RTL8822CE      | -                                                                                                                                             |
| Touch Pen     | Getac   | 340GA8900001   | -                                                                                                                                             |

\*After the pretesting, adapter 3 mode is found to be the worse case and therefore had been chosen for final test.

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

### 3.2 Antenna Description of EUT

1. The antenna information is listed as below.

| Antenna No. | 2.4GHz<br>2400-2483.5 MHz | 5.2GHz<br>5150-5250 MHz | 5.3GHz<br>5250-5350 MHz | 5.6GHz<br>5470-5725 MHz | 5.8GHz<br>5725-5850 MHz | Antenna Type | Connector Type |
|-------------|---------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------|----------------|
| 1           | 2.39                      | 1.06                    | 2.12                    | 1.40                    | 1.40                    | PIFA         | N/A            |
| 2           | 2.20                      | 3.55                    | 3.09                    | 4.53                    | 4.53                    | PIFA         | N/A            |

\* Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

2. The EUT incorporates a MIMO function:

| 2.4 GHz Band    |                  |                       |     |
|-----------------|------------------|-----------------------|-----|
| Modulation Mode | Beamforming Mode | TX & RX Configuration |     |
| 802.11b         | N/A              | 2TX                   | 2RX |
| 802.11g         | N/A              | 2TX                   | 2RX |
| 802.11n (HT20)  | Support          | 2TX                   | 2RX |
| 802.11n (HT40)  | Support          | 2TX                   | 2RX |
| VHT20           | Support          | 2TX                   | 2RX |
| VHT40           | Support          | 2TX                   | 2RX |

Note:

1. All of modulation mode support beamforming function except 802.11b and 802.11g modulation mode.
2. The EUT support Beamforming and CDD mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.
3. The modulation and bandwidth are similar for 802.11n mode for 20 MHz (40 MHz), VHT mode for 20 MHz (40 MHz). Therefore the investigated worst case is the representative mode in test report.

### 3.3 Channel List

13 channels are provided for 802.11b, 802.11g, 802.11n (HT20), VHT20:

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 1       | 2412 MHz  | 8       | 2447 MHz  |
| 2       | 2417 MHz  | 9       | 2452 MHz  |
| 3       | 2422 MHz  | 10      | 2457 MHz  |
| 4       | 2427 MHz  | 11      | 2462 MHz  |
| 5       | 2432 MHz  | 12      | 2467 MHz  |
| 6       | 2437 MHz  | 13      | 2472 MHz  |
| 7       | 2442 MHz  |         |           |

9 channels are provided for 802.11n (HT40), 802.11ax (HE40), VHT40:

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 3       | 2422 MHz  | 8       | 2447 MHz  |
| 4       | 2427 MHz  | 9       | 2452 MHz  |
| 5       | 2432 MHz  | 10      | 2457 MHz  |
| 6       | 2437 MHz  | 11      | 2462 MHz  |
| 7       | 2442 MHz  |         |           |

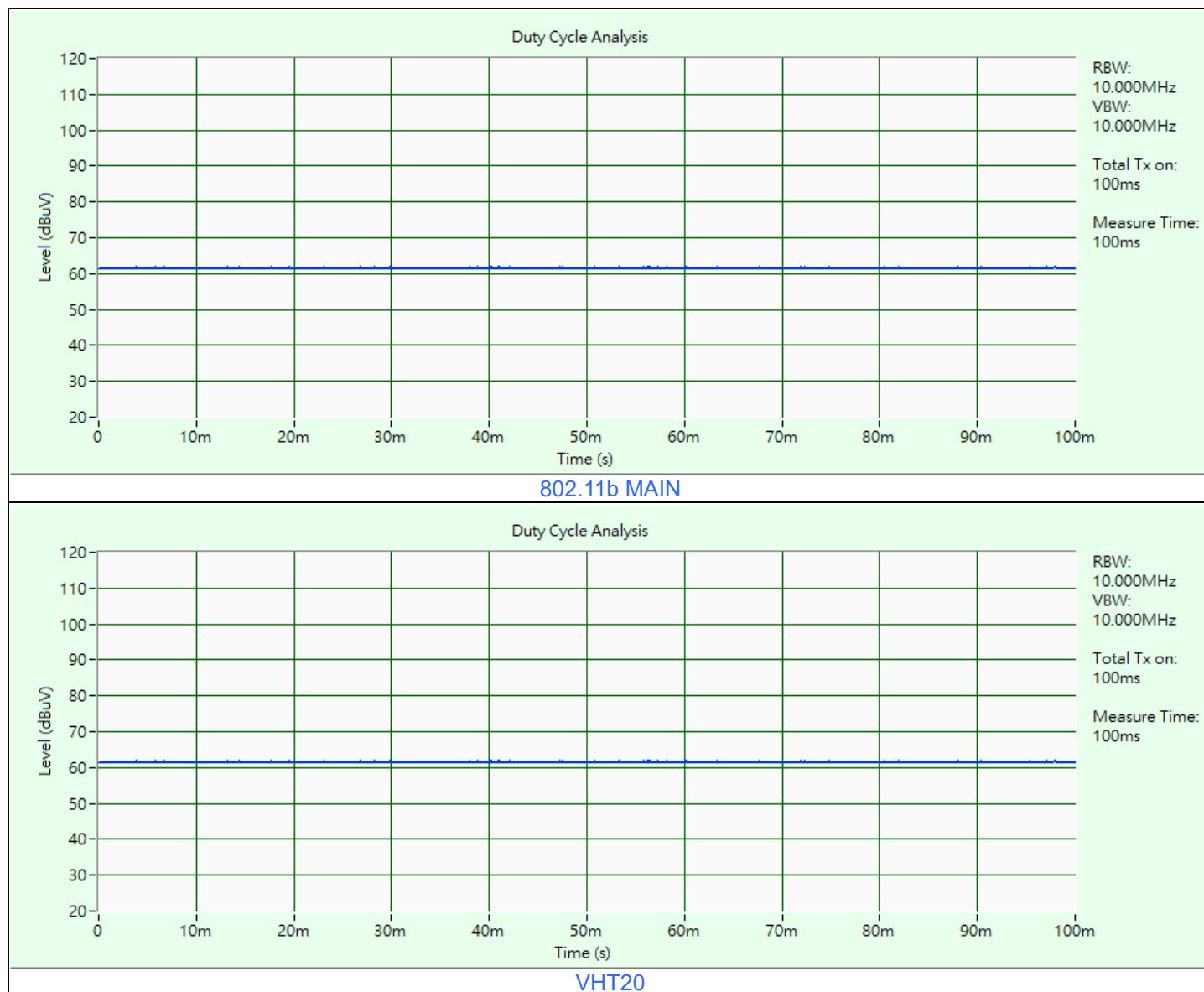
### 3.4 Test Mode Applicability and Tested Channel Detail

| Test Item                                                       | Mode            | Ant. Mode | Signal Mode       | Tested Channel   | Modulation | Data Rate Parameter |
|-----------------------------------------------------------------|-----------------|-----------|-------------------|------------------|------------|---------------------|
| RF Output Power                                                 | 802.11b         | 1TX/2TX   | CDD               | 1, 6, 11, 12, 13 | DBPSK      | 1Mb/s               |
|                                                                 | 802.11g         | 1TX/2TX   | CDD               | 1, 6, 11, 12, 13 | BPSK       | 6Mb/s               |
|                                                                 | VHT20           | 1TX/2TX   | CDD & Beamforming | 1, 6, 11, 12, 13 | BPSK       | MCS0                |
|                                                                 | VHT40           | 1TX/2TX   | CDD & Beamforming | 3, 6, 9, 10, 11  | BPSK       | MCS0                |
| AC Power Conducted Emissions                                    | VHT20           | 2TX       | CDD               | 13               | BPSK       | MCS0                |
| Unwanted Emissions below 1 GHz                                  | VHT20           | 2TX       | CDD               | 13               | BPSK       | MCS0                |
| Unwanted Emissions above 1 GHz                                  | 802.11b         | 1TX       | CDD               | 13               | BPSK       | MCS0                |
|                                                                 | VHT20           | 2TX       | CDD               | 13               | BPSK       | MCS0                |
| EUT Configure Mode:                                             | EUT + Adapter 3 |           |                   |                  |            |                     |
| Note: The EUT is designed to be positioned on the NB Mode only. |                 |           |                   |                  |            |                     |

### 3.5 Duty Cycle of Test Signal

**802.11b:** Duty cycle = 100 ms / 100 ms x 100% = 100.0%

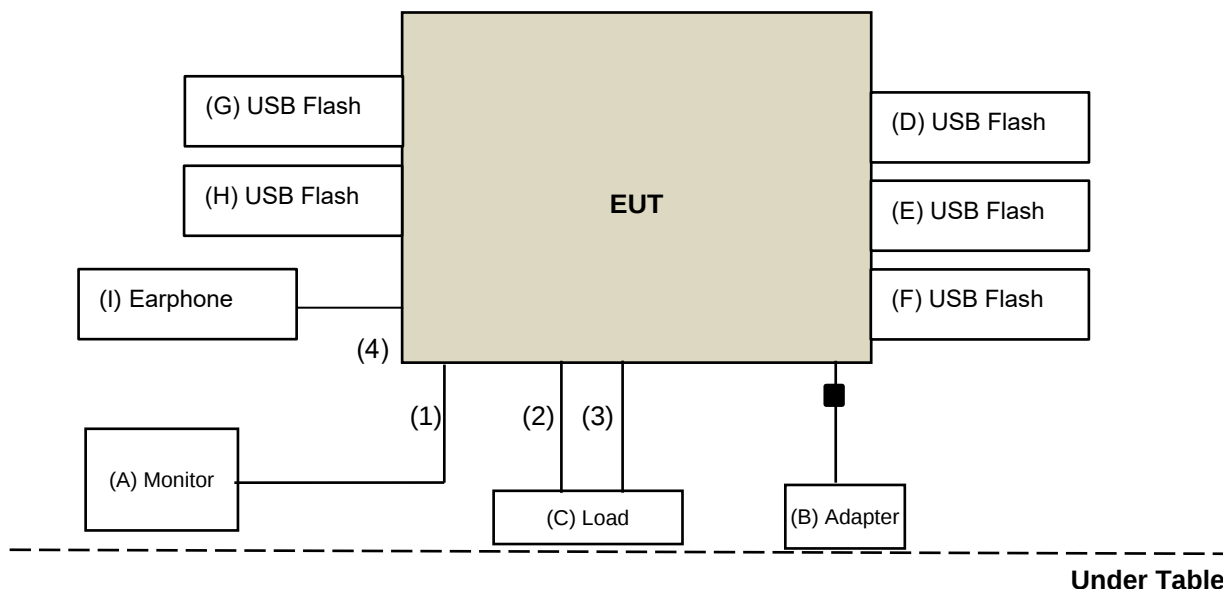
**VHT20:** Duty cycle = 100 ms / 100 ms x 100% = 100.0%



### 3.6 Test Program Used and Operation Descriptions

Controlling software RTL 8822CE MP Version 0.0001.1020.2018 has been activated to set the EUT under transmission condition continuously at specific channel frequency.

### 3.7 Connection Diagram of EUT and Peripheral Devices



### 3.8 Configuration of Peripheral Devices and Cable Connections

| ID | Product  | Brand   | Model No.      | Serial No.               | FCC ID | Remarks          |
|----|----------|---------|----------------|--------------------------|--------|------------------|
| A  | Monitor  | DELL    | A14S2421HSXmTW | CN-01KQFW-WSL00-24C-711B | N/A    | Provided by Lab  |
| B  | Adapter  | Chicony | A17-120P1A     | NA                       | N/A    | Accessory of EUT |
| C  | Load     | NA      | NA             | NA                       | N/A    | Provided by Lab  |
| D  | Flash    | SanDisk | SDDDC3-032G    | NA                       | N/A    | Provided by Lab  |
| E  | Flash    | SanDisk | SDDDC3-032G    | NA                       | N/A    | Provided by Lab  |
| F  | Flash    | SanDisk | SDDDC3-032G    | NA                       | N/A    | Provided by Lab  |
| G  | Flash    | SanDisk | SDDDC3-032G    | NA                       | N/A    | Provided by Lab  |
| H  | Flash    | SanDisk | SDDDC3-032G    | NA                       | N/A    | Provided by Lab  |
| I  | Earphone | APPLE   | MB77PFEB       | NA                       | N/A    | Provided by Lab  |

| ID | Cable Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks         |
|----|--------------------|------|------------|--------------------|--------------|-----------------|
| 1  | HDMI Cable         | 1    | 1.5        | Y                  | 0            | Provided by Lab |
| 2  | RJ-45 Cable        | 1    | 1.5        | N                  | 0            | Provided by Lab |
| 3  | RJ-45 Cable        | 1    | 1.5        | N                  | 0            | Provided by Lab |
| 4  | Earphone Cable     | 1    | 1.2        | N                  | 0            | Provided by Lab |

## 4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.1 RF Output Power

| Description<br>Manufacturer       | Model No. | Serial No. | Calibrated<br>Date | Calibrated<br>Until |
|-----------------------------------|-----------|------------|--------------------|---------------------|
| Peak Power Analyzer<br>Keysight   | 8990B     | MY51000485 | 2024/1/21          | 2025/1/20           |
| Wideband Power Sensor<br>Keysight | N1923A    | MY58020002 | 2024/1/18          | 2025/1/17           |
|                                   |           | MY58140009 | 2024/1/18          | 2025/1/17           |

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2024/12/19

### 4.2 AC Power Conducted Emissions

| Description<br>Manufacturer                | Model No.               | Serial No.     | Calibrated<br>Date | Calibrated<br>Until |
|--------------------------------------------|-------------------------|----------------|--------------------|---------------------|
| 50 ohm terminal resistance<br>HUBER+SUHNER | E1-011277               | 02             | 2024/10/25         | 2025/10/24          |
|                                            | E1-011313               | 11             | 2024/2/1           | 2025/1/31           |
|                                            | E1-011595               | 21             | 2024/3/8           | 2025/3/7            |
| DC-LISN<br>Schwarzbeck                     | NNBM 8126G              | 8126G-069      | 2024/11/5          | 2025/11/4           |
| EMI Test Receiver<br>R&S                   | ESR3                    | 102783         | 2023/12/13         | 2024/12/12          |
| Fixed Attenuator<br>STI                    | BNC5W10dB               | PAD-COND2-01   | 2024/8/25          | 2025/8/24           |
| LISN<br>R&S                                | ESH2-Z5                 | 100100         | 2024/3/6           | 2025/3/5            |
|                                            | ESH3-Z5                 | 100312         | 2024/9/9           | 2025/9/8            |
| RF Coaxial Cable<br>Woken                  | 5D-FB                   | Cable-cond2-01 | 2024/8/25          | 2025/8/24           |
| Software<br>BVADT                          | BVADT_Cond_<br>V7.4.1.0 | N/A            | N/A                | N/A                 |
| V-LISN<br>Schwarzbeck                      | NNBL 8226-2             | 8226-142       | 2024/8/28          | 2025/8/27           |

Notes:

1. The test was performed in HY - Conduction 2.
2. Tested Date: 2024/12/10

### 4.3 Unwanted Emissions below 1 GHz

| Description<br>Manufacturer       | Model No.                    | Serial No.   | Calibrated<br>Date | Calibrated<br>Until |
|-----------------------------------|------------------------------|--------------|--------------------|---------------------|
| Antenna Tower & Turn<br>BV ADT    | AT100                        | AT93021705   | N/A                | N/A                 |
| Bi_Log Antenna<br>Schwarzbeck     | VULB 9168                    | 9168-160     | 2024/10/9          | 2025/10/8           |
| Loop Antenna<br>TESEQ             | HLA 6121                     | 45745        | 2024/8/21          | 2025/8/20           |
| MXE EMI Receiver<br>Keysight      | N9038B                       | MY60180018   | 2024/3/13          | 2025/3/12           |
| Preamplifier<br>Agilent           | 8447D                        | 2944A10638   | 2024/5/1           | 2025/4/30           |
| Preamplifier<br>EMCI              | EMC001340                    | 980201       | 2024/9/24          | 2025/9/23           |
| RF Coaxial Cable<br>Woken         | 8D-FB                        | Cable-CH9-01 | 2024/5/1           | 2025/4/30           |
| Signal & Spectrum Analyzer<br>R&S | FSW43                        | 101867       | 2023/12/29         | 2024/12/28          |
| Software<br>BV ADT                | ADT_Radiated_<br>V7.6.15.9.5 | N/A          | N/A                | N/A                 |
| Turn Table<br>BV ADT              | TT100                        | TT93021705   | N/A                | N/A                 |
| Turn Table Controller<br>BV ADT   | SC100                        | SC93021705   | N/A                | N/A                 |

Notes:

1. The test was performed in HY - 966 chamber 4.
2. Tested Date: 2024/12/9

#### 4.4 Unwanted Emissions above 1 GHz

| Description<br>Manufacturer           | Model No.                         | Serial No.                      | Calibrated<br>Date | Calibrated<br>Until |
|---------------------------------------|-----------------------------------|---------------------------------|--------------------|---------------------|
| Antenna Tower & Turn<br>BV ADT        | AT100                             | AT93021705                      | N/A                | N/A                 |
| Boresight antenna tower fixture<br>BV | BAF-02                            | 5                               | N/A                | N/A                 |
| Horn Antenna<br>Schwarzbeck           | BBHA 9120D                        | 9120D-1169                      | 2024/11/10         | 2025/11/9           |
|                                       | BBHA 9170                         | 9170-480                        | 2024/11/10         | 2025/11/9           |
|                                       |                                   | BBHA9170243                     | 2024/11/10         | 2025/11/9           |
| MXE EMI Receiver<br>Keysight          | N9038B                            | MY60180018                      | 2024/3/13          | 2025/3/12           |
| Preamplifier<br>Agilent               | 8449B                             | 3008A02367                      | 2024/1/6           | 2025/1/5            |
| Preamplifier<br>EMCI                  | EMC 184045                        | 980116                          | 2024/9/24          | 2025/9/23           |
| RF Coaxial Cable<br>EMCI              | EMC102-KM-KM-600                  | 150928                          | 2024/7/6           | 2025/7/5            |
|                                       | EMC102-KM-KM-3000                 | 150929                          | 2024/7/6           | 2025/7/5            |
| RF Coaxial Cable<br>HUBER+SUHNER      | SUCOFLEX 104                      | CABLE-CH9-(250795/4)            | 2024/1/6           | 2025/1/5            |
| RF Coaxial Cable<br>HUBER+SUHNER&EMCI | SUCOFLEX 104&<br>EMC104-SM-SM8000 | CABLE-CH9-02<br>(248780+171006) | 2024/1/6           | 2025/1/5            |
| Signal & Spectrum Analyzer<br>R&S     | FSW43                             | 101867                          | 2023/12/29         | 2024/12/28          |
| Software<br>BV ADT                    | ADT_Radiated_<br>V7.6.15.9.5      | N/A                             | N/A                | N/A                 |
| Turn Table<br>BV ADT                  | TT100                             | TT93021705                      | N/A                | N/A                 |
| Turn Table Controller<br>BV ADT       | SC100                             | SC93021705                      | N/A                | N/A                 |

**Notes:**

1. The test was performed in HY - 966 chamber 4.
2. Tested Date: 2024/12/10 ~ 2024/12/24

## 5 Limits of Test Items

### 5.1 RF Output Power

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30 dBm)

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for  $N_{ANT} \leq 4$ ;

Array Gain = 0 dB (i.e., no array gain) for channel widths  $\geq 40$  MHz for any  $N_{ANT}$ ;

Array Gain =  $5 \log(N_{ANT}/N_{SS})$  dB or 3 dB, whichever is less, for 20-MHz channel widths with  $N_{ANT} \geq 5$ .

For power measurements on all other devices: Array Gain =  $10 \log(N_{ANT}/N_{SS})$  dB.

### 5.2 AC Power Conducted Emissions

| Frequency (MHz) | Conducted Limit (dBuV) |         |
|-----------------|------------------------|---------|
|                 | Quasi-peak             | Average |
| 0.15 - 0.5      | 66 - 56                | 56 - 46 |
| 0.50 - 5.0      | 56                     | 46      |
| 5.0 - 30.0      | 60                     | 50      |

Notes:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

### 5.3 Unwanted Emissions below 1 GHz

Radiated emissions up to 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009 ~ 0.490     | 2400/F(kHz)                       | 300                           |
| 0.490 ~ 1.705     | 24000/F(kHz)                      | 30                            |
| 1.705 ~ 30.0      | 30                                | 30                            |
| 30 ~ 88           | 100                               | 3                             |
| 88 ~ 216          | 150                               | 3                             |
| 216 ~ 960         | 200                               | 3                             |
| Above 960         | 500                               | 3                             |

Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) =  $20 \log$  Emission level (uV/m).

#### 5.4 Unwanted Emissions above 1 GHz

Radiated emissions above 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Other emissions:

- (1) For Peak conducted power limits shall be at least 20 dB below the highest level of the desired power:
- (2) For RMS averaging conducted power limits shall be at least 30 dB below the highest level of the desired power:

| Frequencies<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(meters) |
|----------------------|--------------------------------------|----------------------------------|
| Above 960            | 500                                  | 3                                |

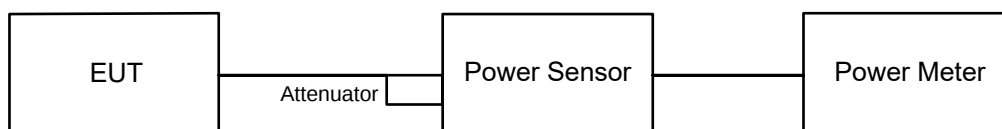
Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

## 6 Test Arrangements

### 6.1 RF Output Power

#### 6.1.1 Test Setup



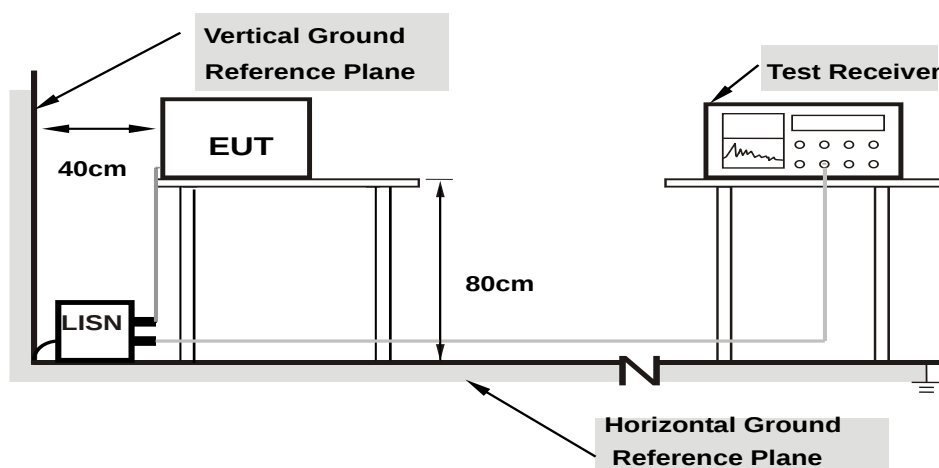
#### 6.1.2 Test Procedure

Average Power:

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

### 6.2 AC Power Conducted Emissions

#### 6.2.1 Test Setup



**Note: 1.Support units were connected to second LISN.**

For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 6.2.2 Test Procedure

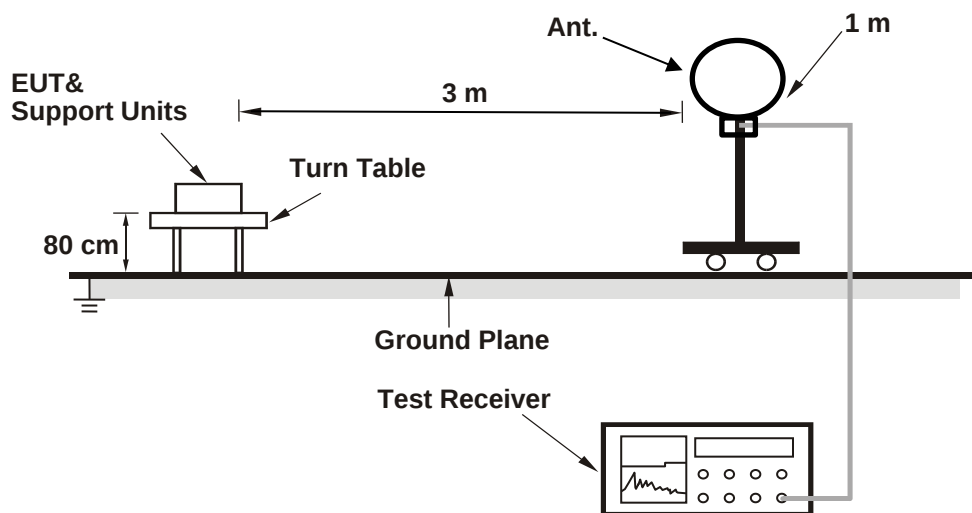
- The EUT was placed on a 0.8 meter to the top of table and placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz-30 MHz.

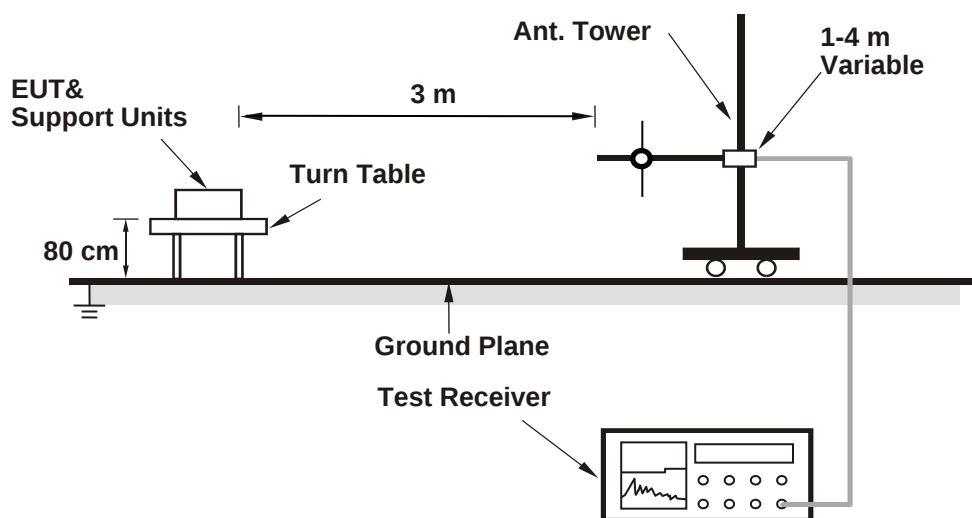
### 6.3 Unwanted Emissions below 1 GHz

#### 6.3.1 Test Setup

##### For Radiated emission below 30 MHz



##### For Radiated emission above 30 MHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 6.3.2 Test Procedure

#### For Radiated emission below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode, except for the frequency band (9 kHz to 90 kHz and 110 kHz to 490 kHz) set to average detect function and peak detect function.

#### Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200 Hz at frequency below 150 kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz or 10 kHz at frequency (150 kHz to 30 MHz).
3. All modes of operation were investigated and the worst-case emissions are reported.

#### For Radiated emission above 30 MHz

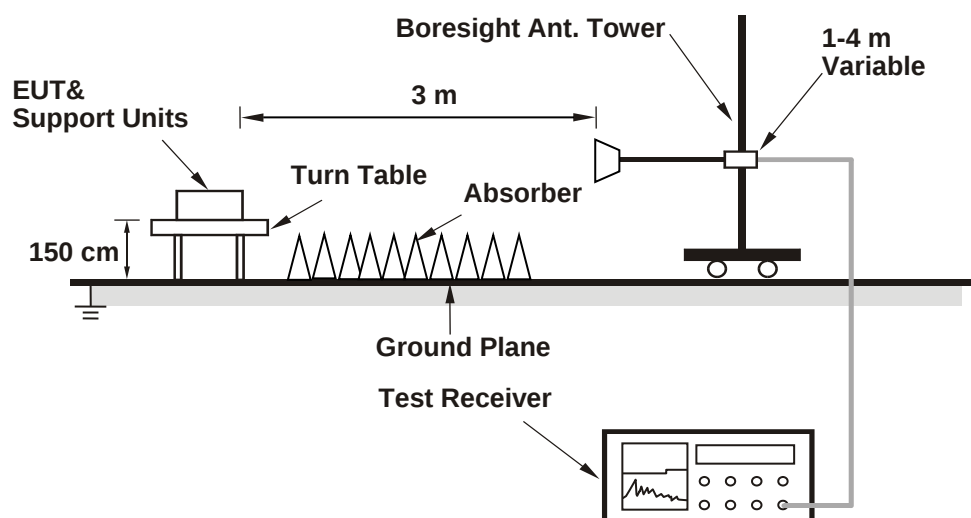
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

#### Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

## 6.4 Unwanted Emissions above 1 GHz

### 6.4.1 Test Setup



For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 6.4.2 Test Procedure

- The EUT was placed on the top of a rotating table 1.5 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

#### Notes:

- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1 GHz.
- For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle  $< 98\%$ ) or 10 Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1 GHz.
- All modes of operation were investigated and the worst-case emissions are reported.

## 7 Test Results of Test Item

### 7.1 RF Output Power

|              |                |                           |              |            |           |
|--------------|----------------|---------------------------|--------------|------------|-----------|
| Input Power: | 120 Vac, 60 Hz | Environmental Conditions: | 25°C, 60% RH | Tested By: | Chris Lin |
|--------------|----------------|---------------------------|--------------|------------|-----------|

#### For Peak Power

##### 802.11b MAIN

| Chan. | Chan. Freq. (MHz) | Peak Power (mW) | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|-------|-------------------|-----------------|------------------|-------------------|-------------|
| 1     | 2412              | 55.719          | 17.46            | 30                | Pass        |
| 6     | 2437              | 55.59           | 17.45            | 30                | Pass        |
| 11    | 2462              | 55.59           | 17.45            | 30                | Pass        |
| 12    | 2467              | 46.881          | 16.71            | 30                | Pass        |
| 13    | 2472              | 30.761          | 14.88            | 30                | Pass        |

Note: The antenna gain is -3.35 dBi < 6 dBi, so the output power limit shall not be reduced.

##### 802.11g MAIN

| Chan. | Chan. Freq. (MHz) | Peak Power (mW) | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|-------|-------------------|-----------------|------------------|-------------------|-------------|
| 1     | 2412              | 174.181         | 22.41            | 30                | Pass        |
| 6     | 2437              | 252.348         | 24.02            | 30                | Pass        |
| 11    | 2462              | 203.236         | 23.08            | 30                | Pass        |
| 12    | 2467              | 101.859         | 20.08            | 30                | Pass        |
| 13    | 2472              | 77.268          | 18.88            | 30                | Pass        |

Note: The antenna gain is -3.35 dBi < 6 dBi, so the output power limit shall not be reduced.

##### VHT20 MAIN

| Chan. | Chan. Freq. (MHz) | Peak Power (mW) | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|-------|-------------------|-----------------|------------------|-------------------|-------------|
| 1     | 2412              | 201.837         | 23.05            | 30                | Pass        |
| 6     | 2437              | 232.274         | 23.66            | 30                | Pass        |
| 11    | 2462              | 206.538         | 23.15            | 30                | Pass        |
| 12    | 2467              | 99.541          | 19.98            | 30                | Pass        |
| 13    | 2472              | 51.404          | 17.11            | 30                | Pass        |

Note: The antenna gain is -3.35 dBi < 6 dBi, so the output power limit shall not be reduced.

# VHT40 MAIN

| Chan. | Chan. Freq. (MHz) | Peak Power (mW) | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|-------|-------------------|-----------------|------------------|-------------------|-------------|
| 3     | 2422              | 209.411         | 23.21            | 30                | Pass        |
| 6     | 2437              | 231.739         | 23.65            | 30                | Pass        |
| 9     | 2452              | 214.289         | 23.31            | 30                | Pass        |
| 10    | 2457              | 100.462         | 20.02            | 30                | Pass        |
| 11    | 2462              | 50.466          | 17.03            | 30                | Pass        |

Note: The antenna gain is -3.35 dBi < 6 dBi, so the output power limit shall not be reduced.

### 802.11b AUX

| Chan. | Chan. Freq. (MHz) | Peak Power (mW) | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|-------|-------------------|-----------------|------------------|-------------------|-------------|
| 1     | 2412              | 55.59           | 17.45            | 30                | Pass        |
| 6     | 2437              | 55.335          | 17.43            | 30                | Pass        |
| 11    | 2462              | 55.463          | 17.44            | 30                | Pass        |
| 12    | 2467              | 46.666          | 16.69            | 30                | Pass        |
| 13    | 2472              | 30.549          | 14.85            | 30                | Pass        |

Note: The antenna gain is -3.96 dBi < 6 dBi, so the output power limit shall not be reduced.

### 802.11g AUX

| Chan. | Chan. Freq. (MHz) | Peak Power (mW) | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|-------|-------------------|-----------------|------------------|-------------------|-------------|
| 1     | 2412              | 172.187         | 22.36            | 30                | Pass        |
| 6     | 2437              | 246.037         | 23.91            | 30                | Pass        |
| 11    | 2462              | 202.302         | 23.06            | 30                | Pass        |
| 12    | 2467              | 100.462         | 20.02            | 30                | Pass        |
| 13    | 2472              | 76.033          | 18.81            | 30                | Pass        |

Note: The antenna gain is -3.96 dBi < 6 dBi, so the output power limit shall not be reduced.

### VHT20 AUX

| Chan. | Chan. Freq. (MHz) | Peak Power (mW) | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|-------|-------------------|-----------------|------------------|-------------------|-------------|
| 1     | 2412              | 198.609         | 22.98            | 30                | Pass        |
| 6     | 2437              | 198.153         | 22.97            | 30                | Pass        |
| 11    | 2462              | 203.704         | 23.09            | 30                | Pass        |
| 12    | 2467              | 98.401          | 19.93            | 30                | Pass        |
| 13    | 2472              | 51.168          | 17.09            | 30                | Pass        |

Note: The antenna gain is -3.96 dBi < 6 dBi, so the output power limit shall not be reduced.

# VHT40 AUX

| Chan. | Chan. Freq. (MHz) | Peak Power (mW) | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|-------|-------------------|-----------------|------------------|-------------------|-------------|
| 3     | 2422              | 206.538         | 23.15            | 30                | Pass        |
| 6     | 2437              | 229.615         | 23.61            | 30                | Pass        |
| 9     | 2452              | 212.324         | 23.27            | 30                | Pass        |
| 10    | 2457              | 99.083          | 19.96            | 30                | Pass        |
| 11    | 2462              | 49.774          | 16.97            | 30                | Pass        |

Note: The antenna gain is -3.96 dBi < 6 dBi, so the output power limit shall not be reduced.

### 802.11b MIMO

| Chan. | Chan. Freq.<br>(MHz) | Peak Power (dBm) |         | Total Power<br>(mW) | Total Power<br>(dBm) | Power Limit<br>(dBm) | Test Result |
|-------|----------------------|------------------|---------|---------------------|----------------------|----------------------|-------------|
|       |                      | Chain 0          | Chain 1 |                     |                      |                      |             |
| 1     | 2412                 | 16.03            | 15.98   | 79.714              | 19.02                | 30                   | Pass        |
| 6     | 2437                 | 16.01            | 15.99   | 79.622              | 19.01                | 30                   | Pass        |
| 11    | 2462                 | 15.98            | 15.96   | 79.074              | 18.98                | 30                   | Pass        |
| 12    | 2467                 | 16.05            | 16.01   | 80.174              | 19.04                | 30                   | Pass        |
| 13    | 2472                 | 12.11            | 12.08   | 32.399              | 15.11                | 30                   | Pass        |

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is -3.35 dBi < 6 dBi, so the output power limit shall not be reduced.

### 802.11g MIMO

| Chan. | Chan. Freq.<br>(MHz) | Peak Power (dBm) |         | Total Power<br>(mW) | Total Power<br>(dBm) | Power Limit<br>(dBm) | Test Result |
|-------|----------------------|------------------|---------|---------------------|----------------------|----------------------|-------------|
|       |                      | Chain 0          | Chain 1 |                     |                      |                      |             |
| 1     | 2412                 | 22.45            | 22.33   | 346.794             | 25.40                | 30                   | Pass        |
| 6     | 2437                 | 22.41            | 22.36   | 346.368             | 25.40                | 30                   | Pass        |
| 11    | 2462                 | 22.46            | 22.25   | 344.078             | 25.37                | 30                   | Pass        |
| 12    | 2467                 | 20.59            | 20.51   | 227.012             | 23.56                | 30                   | Pass        |
| 13    | 2472                 | 17.57            | 17.49   | 113.253             | 20.54                | 30                   | Pass        |

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is -3.35 dBi < 6 dBi, so the output power limit shall not be reduced.

### VHT20 MIMO

| Chan. | Chan. Freq.<br>(MHz) | Peak Power (dBm) |         | Total Power<br>(mW) | Total Power<br>(dBm) | Power Limit<br>(dBm) | Test Result |
|-------|----------------------|------------------|---------|---------------------|----------------------|----------------------|-------------|
|       |                      | Chain 0          | Chain 1 |                     |                      |                      |             |
| 1     | 2412                 | 22.66            | 22.61   | 366.891             | 25.65                | 30                   | Pass        |
| 6     | 2437                 | 22.69            | 22.58   | 366.914             | 25.65                | 30                   | Pass        |
| 11    | 2462                 | 22.64            | 22.60   | 365.624             | 25.63                | 30                   | Pass        |
| 12    | 2467                 | 20.72            | 20.69   | 235.252             | 23.72                | 30                   | Pass        |
| 13    | 2472                 | 17.72            | 17.65   | 117.366             | 20.70                | 30                   | Pass        |

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is -3.35 dBi < 6 dBi, so the output power limit shall not be reduced.

## VHT40 MIMO

| Chan. | Chan. Freq.<br>(MHz) | Peak Power (dBm) |         | Total Power<br>(mW) | Total Power<br>(dBm) | Power Limit<br>(dBm) | Test Result |
|-------|----------------------|------------------|---------|---------------------|----------------------|----------------------|-------------|
|       |                      | Chain 0          | Chain 1 |                     |                      |                      |             |
| 3     | 2422                 | 22.05            | 22.01   | 319.179             | 25.04                | 30                   | Pass        |
| 6     | 2437                 | 22.55            | 22.54   | 359.36              | 25.56                | 30                   | Pass        |
| 9     | 2452                 | 22.37            | 22.29   | 342.018             | 25.34                | 30                   | Pass        |
| 12    | 2467                 | 19.95            | 19.89   | 196.354             | 22.93                | 30                   | Pass        |
| 13    | 2472                 | 16.61            | 16.52   | 90.689              | 19.58                | 30                   | Pass        |

Notes:

1. Directional gain is the maximum gain of antennas.
2. The maximum gain is -3.35 dBi < 6 dBi, so the output power limit shall not be reduced.

## VHT20 Beamforming

| Chan. | Chan. Freq.<br>(MHz) | Peak Power (dBm) |         | Total Power<br>(mW) | Total Power<br>(dBm) | Power Limit<br>(dBm) | Test Result |
|-------|----------------------|------------------|---------|---------------------|----------------------|----------------------|-------------|
|       |                      | Chain 0          | Chain 1 |                     |                      |                      |             |
| 1     | 2412                 | 22.66            | 22.61   | 366.891             | 25.65                | 30                   | Pass        |
| 6     | 2437                 | 22.69            | 22.58   | 366.914             | 25.65                | 30                   | Pass        |
| 11    | 2462                 | 22.64            | 22.60   | 365.624             | 25.63                | 30                   | Pass        |
| 12    | 2467                 | 20.72            | 20.69   | 235.252             | 23.72                | 30                   | Pass        |
| 13    | 2472                 | 17.72            | 17.65   | 117.366             | 20.70                | 30                   | Pass        |

Notes:

1. Directional gain =  $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$
2. The directional gain is -0.64 dBi < 6 dBi, so the output power limit shall not be reduced.

## VHT40 Beamforming

| Chan. | Chan. Freq.<br>(MHz) | Peak Power (dBm) |         | Total Power<br>(mW) | Total Power<br>(dBm) | Power Limit<br>(dBm) | Test Result |
|-------|----------------------|------------------|---------|---------------------|----------------------|----------------------|-------------|
|       |                      | Chain 0          | Chain 1 |                     |                      |                      |             |
| 3     | 2422                 | 22.05            | 22.01   | 319.179             | 25.04                | 30                   | Pass        |
| 6     | 2437                 | 22.55            | 22.54   | 359.36              | 25.56                | 30                   | Pass        |
| 9     | 2452                 | 22.37            | 22.29   | 342.018             | 25.34                | 30                   | Pass        |
| 12    | 2467                 | 19.95            | 19.89   | 196.354             | 22.93                | 30                   | Pass        |
| 13    | 2472                 | 16.61            | 16.52   | 90.689              | 19.58                | 30                   | Pass        |

Notes:

1. Directional gain =  $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$
2. The directional gain is -0.64 dBi < 6 dBi, so the output power limit shall not be reduced.

## For Average Power

### 802.11b MAIN

| Chan. | Chan. Freq.<br>(MHz) | Average Power (mW) | Average Power (dBm) |
|-------|----------------------|--------------------|---------------------|
| 1     | 2412                 | 35.4               | 15.49               |
| 6     | 2437                 | 35.237             | 15.47               |
| 11    | 2462                 | 35.237             | 15.47               |
| 12    | 2467                 | 27.542             | 14.40               |
| 13    | 2472                 | 19.815             | 12.97               |

### 802.11g MAIN

| Chan. | Chan. Freq.<br>(MHz) | Average Power (mW) | Average Power (dBm) |
|-------|----------------------|--------------------|---------------------|
| 1     | 2412                 | 25.468             | 14.06               |
| 6     | 2437                 | 35.318             | 15.48               |
| 11    | 2462                 | 25.645             | 14.09               |
| 12    | 2467                 | 13.032             | 11.15               |
| 13    | 2472                 | 6.637              | 8.22                |

### VHT20 MAIN

| Chan. | Chan. Freq.<br>(MHz) | Average Power (mW) | Average Power (dBm) |
|-------|----------------------|--------------------|---------------------|
| 1     | 2412                 | 26.242             | 14.19               |
| 6     | 2437                 | 35.318             | 15.48               |
| 11    | 2462                 | 26.424             | 14.22               |
| 12    | 2467                 | 12.972             | 11.13               |
| 13    | 2472                 | 6.607              | 8.20                |

### VHT40 MAIN

| Chan. | Chan. Freq.<br>(MHz) | Average Power (mW) | Average Power (dBm) |
|-------|----------------------|--------------------|---------------------|
| 3     | 2422                 | 26.062             | 14.16               |
| 6     | 2437                 | 34.914             | 15.43               |
| 9     | 2452                 | 26.182             | 14.18               |
| 10    | 2457                 | 13.213             | 11.21               |
| 11    | 2462                 | 6.471              | 8.11                |

### 802.11b AUX

| Chan. | Chan. Freq.<br>(MHz) | Average Power (mW) | Average Power (dBm) |
|-------|----------------------|--------------------|---------------------|
| 1     | 2412                 | 35.237             | 15.47               |
| 6     | 2437                 | 35.075             | 15.45               |
| 11    | 2462                 | 35.156             | 15.46               |
| 12    | 2467                 | 27.227             | 14.35               |
| 13    | 2472                 | 19.634             | 12.93               |

### 802.11g AUX

| Chan. | Chan. Freq.<br>(MHz) | Average Power (mW) | Average Power (dBm) |
|-------|----------------------|--------------------|---------------------|
| 1     | 2412                 | 25.177             | 14.01               |
| 6     | 2437                 | 35.237             | 15.47               |
| 11    | 2462                 | 25.293             | 14.03               |
| 12    | 2467                 | 12.764             | 11.06               |
| 13    | 2472                 | 6.531              | 8.15                |

### VHT20 AUX

| Chan. | Chan. Freq.<br>(MHz) | Average Power (mW) | Average Power (dBm) |
|-------|----------------------|--------------------|---------------------|
| 1     | 2412                 | 26.062             | 14.16               |
| 6     | 2437                 | 35.237             | 15.47               |
| 11    | 2462                 | 26.002             | 14.15               |
| 12    | 2467                 | 12.823             | 11.08               |
| 13    | 2472                 | 6.577              | 8.18                |

### VHT40 AUX

| Chan. | Chan. Freq.<br>(MHz) | Average Power (mW) | Average Power (dBm) |
|-------|----------------------|--------------------|---------------------|
| 3     | 2422                 | 25.763             | 14.11               |
| 6     | 2437                 | 34.594             | 15.39               |
| 9     | 2452                 | 25.645             | 14.09               |
| 10    | 2457                 | 13.122             | 11.18               |
| 11    | 2462                 | 6.427              | 8.08                |

### 802.11b MIMO

| Chan. | Chan. Freq.<br>(MHz) | Average Power (dBm) |         | Total Average<br>Power (mW) | Total Average<br>Power (dBm) |
|-------|----------------------|---------------------|---------|-----------------------------|------------------------------|
|       |                      | Chain 0             | Chain 1 |                             |                              |
| 1     | 2412                 | 13.97               | 13.93   | 49.663                      | 16.96                        |
| 6     | 2437                 | 13.96               | 13.95   | 49.72                       | 16.97                        |
| 11    | 2462                 | 13.95               | 13.93   | 49.549                      | 16.95                        |
| 12    | 2467                 | 13.97               | 13.95   | 49.777                      | 16.97                        |
| 13    | 2472                 | 10.21               | 10.11   | 20.752                      | 13.17                        |

### 802.11g MIMO

| Chan. | Chan. Freq.<br>(MHz) | Average Power (dBm) |         | Total Average<br>Power (mW) | Total Average<br>Power (dBm) |
|-------|----------------------|---------------------|---------|-----------------------------|------------------------------|
|       |                      | Chain 0             | Chain 1 |                             |                              |
| 1     | 2412                 | 14.01               | 13.93   | 49.894                      | 16.98                        |
| 6     | 2437                 | 13.97               | 13.92   | 49.606                      | 16.96                        |
| 11    | 2462                 | 13.99               | 13.89   | 49.552                      | 16.95                        |
| 12    | 2467                 | 11.33               | 11.26   | 26.949                      | 14.31                        |
| 13    | 2472                 | 8.45                | 8.22    | 13.636                      | 11.35                        |

### VHT20 MIMO

| Chan. | Chan. Freq.<br>(MHz) | Average Power (dBm) |         | Total Average<br>Power (mW) | Total Average<br>Power (dBm) |
|-------|----------------------|---------------------|---------|-----------------------------|------------------------------|
|       |                      | Chain 0             | Chain 1 |                             |                              |
| 1     | 2412                 | 13.98               | 13.94   | 49.778                      | 16.97                        |
| 6     | 2437                 | 13.99               | 13.93   | 49.778                      | 16.97                        |
| 11    | 2462                 | 13.97               | 13.95   | 49.777                      | 16.97                        |
| 12    | 2467                 | 11.27               | 11.21   | 26.61                       | 14.25                        |
| 13    | 2472                 | 8.22                | 8.19    | 13.229                      | 11.22                        |

### VHT40 MIMO

| Chan. | Chan. Freq.<br>(MHz) | Average Power (dBm) |         | Total Average<br>Power (mW) | Total Average<br>Power (dBm) |
|-------|----------------------|---------------------|---------|-----------------------------|------------------------------|
|       |                      | Chain 0             | Chain 1 |                             |                              |
| 3     | 2422                 | 13.09               | 13.03   | 40.461                      | 16.07                        |
| 6     | 2437                 | 13.97               | 13.93   | 49.663                      | 16.96                        |
| 9     | 2452                 | 13.99               | 13.94   | 49.835                      | 16.98                        |
| 12    | 2467                 | 11.11               | 11.07   | 25.706                      | 14.10                        |
| 13    | 2472                 | 7.69                | 7.62    | 11.656                      | 10.67                        |

### VHT20 Beamforming

| Chan. | Chan. Freq.<br>(MHz) | Average Power (dBm) |         | Total Average<br>Power (mW) | Total Average<br>Power (dBm) |
|-------|----------------------|---------------------|---------|-----------------------------|------------------------------|
|       |                      | Chain 0             | Chain 1 |                             |                              |
| 1     | 2412                 | 13.98               | 13.94   | 49.778                      | 16.97                        |
| 6     | 2437                 | 13.99               | 13.93   | 49.778                      | 16.97                        |
| 11    | 2462                 | 13.97               | 13.95   | 49.777                      | 16.97                        |
| 12    | 2467                 | 11.27               | 11.21   | 26.61                       | 14.25                        |
| 13    | 2472                 | 8.22                | 8.19    | 13.229                      | 11.22                        |

### VHT40 Beamforming

| Chan. | Chan. Freq.<br>(MHz) | Average Power (dBm) |         | Total Average<br>Power (mW) | Total Average<br>Power (dBm) |
|-------|----------------------|---------------------|---------|-----------------------------|------------------------------|
|       |                      | Chain 0             | Chain 1 |                             |                              |
| 3     | 2422                 | 13.09               | 13.03   | 40.461                      | 16.07                        |
| 6     | 2437                 | 13.97               | 13.93   | 49.663                      | 16.96                        |
| 9     | 2452                 | 13.99               | 13.94   | 49.835                      | 16.98                        |
| 12    | 2467                 | 11.11               | 11.07   | 25.706                      | 14.10                        |
| 13    | 2472                 | 7.69                | 7.62    | 11.656                      | 10.67                        |

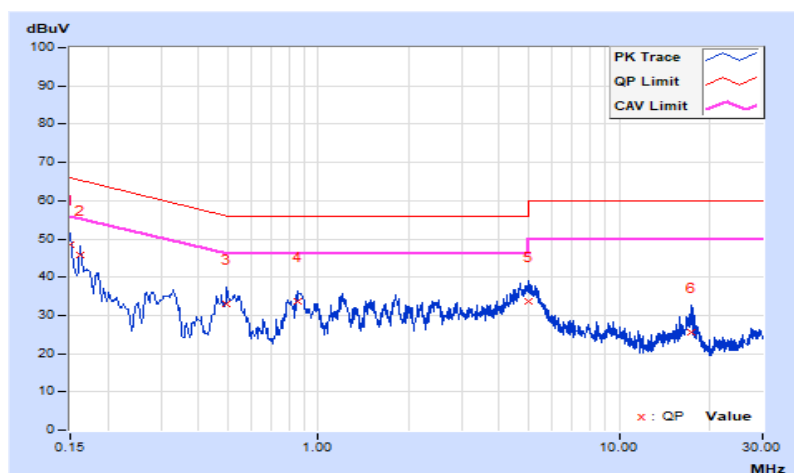
## 7.2 AC Power Conducted Emissions

|                 |                  |                                          |                                       |
|-----------------|------------------|------------------------------------------|---------------------------------------|
| RF Mode         | VHT20            | Channel                                  | CH 13 : 2472 MHz                      |
| Frequency Range | 150 kHz ~ 30 MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9 kHz |
| Input Power     | 120 Vac, 60 Hz   | Environmental Conditions                 | 25 °C, 75 % RH                        |
| Tested By       | Rex Wang         |                                          |                                       |

| Phase Of Power : Line (L) |                 |                        |                      |       |                       |       |              |       |             |        |
|---------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No                        | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |       | Emission Level (dBuV) |       | Limit (dBuV) |       | Margin (dB) |        |
|                           |                 |                        | Q.P.                 | AV.   | Q.P.                  | AV.   | Q.P.         | AV.   | Q.P.        | AV.    |
| 1                         | 0.15000         | 10.10                  | 38.47                | 24.20 | 48.57                 | 34.30 | 66.00        | 56.00 | -17.43      | -21.70 |
| 2                         | 0.16200         | 10.10                  | 35.75                | 24.15 | 45.85                 | 34.25 | 65.36        | 55.36 | -19.51      | -21.11 |
| 3                         | 0.49800         | 10.11                  | 22.87                | 16.69 | 32.98                 | 26.80 | 56.03        | 46.03 | -23.05      | -19.23 |
| 4                         | 0.85800         | 10.13                  | 23.68                | 18.42 | 33.81                 | 28.55 | 56.00        | 46.00 | -22.19      | -17.45 |
| 5                         | 4.98200         | 10.26                  | 23.51                | 17.12 | 33.77                 | 27.38 | 56.00        | 46.00 | -22.23      | -18.62 |
| 6                         | 17.31000        | 10.50                  | 15.07                | 6.18  | 25.57                 | 16.68 | 60.00        | 50.00 | -34.43      | -33.32 |

### Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

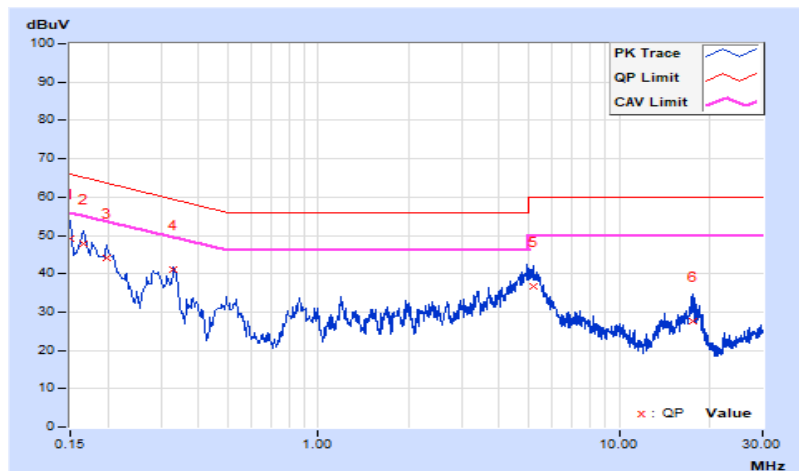


|                 |                  |                                          |                                       |
|-----------------|------------------|------------------------------------------|---------------------------------------|
| RF Mode         | VHT20            | Channel                                  | CH 13 : 2472 MHz                      |
| Frequency Range | 150 kHz ~ 30 MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9 kHz |
| Input Power     | 120 Vac, 60 Hz   | Environmental Conditions                 | 25 °C, 75 % RH                        |
| Tested By       | Rex Wang         |                                          |                                       |

| Phase Of Power : Neutral (N) |                 |                        |                      |              |                       |              |              |              |               |               |
|------------------------------|-----------------|------------------------|----------------------|--------------|-----------------------|--------------|--------------|--------------|---------------|---------------|
| No                           | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |              | Emission Level (dBuV) |              | Limit (dBuV) |              | Margin (dB)   |               |
|                              |                 |                        | Q.P.                 | AV.          | Q.P.                  | AV.          | Q.P.         | AV.          | Q.P.          | AV.           |
| 1                            | 0.15000         | 10.13                  | 39.08                | 30.35        | 49.21                 | 40.48        | 66.00        | 56.00        | -16.79        | -15.52        |
| 2                            | 0.16600         | 10.13                  | 37.81                | 30.77        | 47.94                 | 40.90        | 65.16        | 55.16        | -17.22        | -14.26        |
| 3                            | 0.19800         | 10.14                  | 34.03                | 26.47        | 44.17                 | 36.61        | 63.69        | 53.69        | -19.52        | -17.08        |
| <b>4</b>                     | <b>0.33000</b>  | <b>10.14</b>           | <b>31.02</b>         | <b>27.02</b> | <b>41.16</b>          | <b>37.16</b> | <b>59.45</b> | <b>49.45</b> | <b>-18.29</b> | <b>-12.29</b> |
| 5                            | 5.18200         | 10.31                  | 26.31                | 19.84        | 36.62                 | 30.15        | 60.00        | 50.00        | -23.38        | -19.85        |
| 6                            | 17.66200        | 10.62                  | 16.97                | 8.92         | 27.59                 | 19.54        | 60.00        | 50.00        | -32.41        | -30.46        |

#### Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



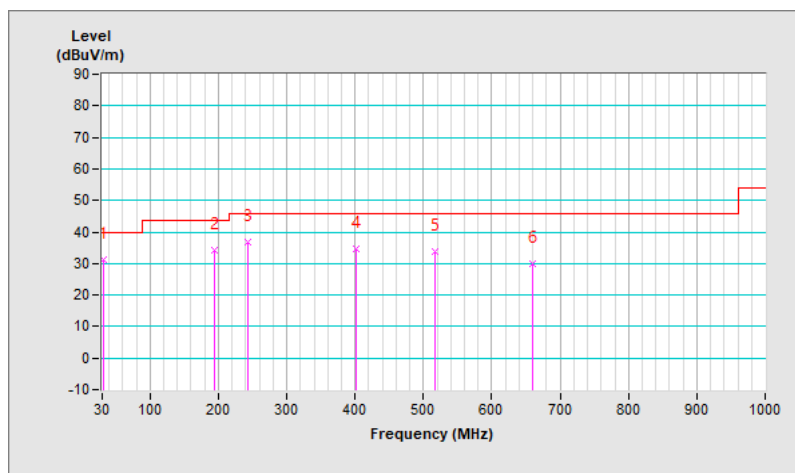
### 7.3 Unwanted Emissions below 1 GHz

|                        |                |                                          |                               |
|------------------------|----------------|------------------------------------------|-------------------------------|
| <b>RF Mode</b>         | VHT20          | <b>Channel</b>                           | CH 13 : 2472 MHz              |
| <b>Frequency Range</b> | 30 MHz ~ 1 GHz | <b>Detector Function &amp; Bandwidth</b> | QP: RB=120kHz, DET=Quasi-Peak |
| <b>Input Power</b>     | 120 Vac, 60 Hz | <b>Environmental Conditions</b>          | 23 °C, 67 % RH                |
| <b>Tested By</b>       | Adair Peng     |                                          |                               |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 32.91           | 31.1 QP                 | 40.0           | -8.9        | 1.51 H             | 234                  | 41.4             | -10.3                    |
| 2                                                    | 193.93          | 34.0 QP                 | 43.5           | -9.5        | 1.01 H             | 268                  | 45.0             | -11.0                    |
| 3                                                    | 242.43          | 36.8 QP                 | 46.0           | -9.2        | 1.01 H             | 174                  | 45.8             | -9.0                     |
| 4                                                    | 401.51          | 34.6 QP                 | 46.0           | -11.4       | 2.00 H             | 85                   | 39.6             | -5.0                     |
| 5                                                    | 516.94          | 33.7 QP                 | 46.0           | -12.3       | 1.51 H             | 304                  | 36.4             | -2.7                     |
| 6                                                    | 659.53          | 30.0 QP                 | 46.0           | -16.0       | 1.51 H             | 212                  | 30.0             | 0.0                      |

#### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

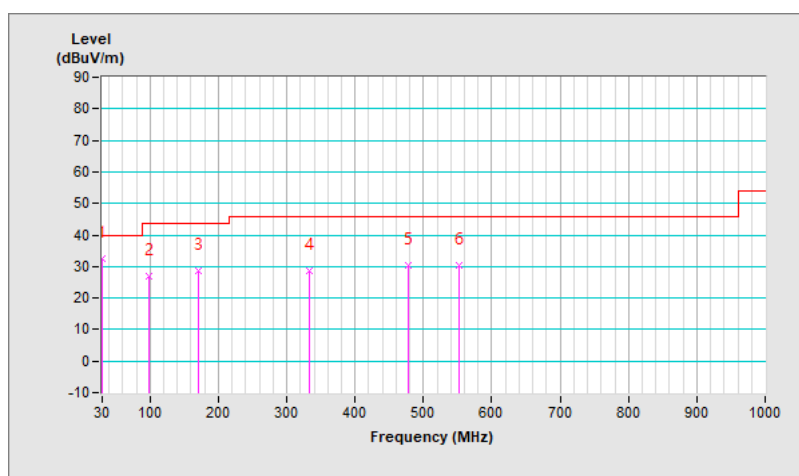


|                        |                |                                          |                               |
|------------------------|----------------|------------------------------------------|-------------------------------|
| <b>RF Mode</b>         | VHT20          | <b>Channel</b>                           | CH 13 : 2472 MHz              |
| <b>Frequency Range</b> | 30 MHz ~ 1 GHz | <b>Detector Function &amp; Bandwidth</b> | QP: RB=120kHz, DET=Quasi-Peak |
| <b>Input Power</b>     | 120 Vac, 60 Hz | <b>Environmental Conditions</b>          | 23 °C, 67 % RH                |
| <b>Tested By</b>       | Adair Peng     |                                          |                               |

| Antenna Polarity & Test Distance : Vertical at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|----------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                 | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                  | 30.00           | 32.3 QP                 | 40.0           | -7.7        | 1.00 V             | 15                   | 42.6             | -10.3                    |
| 2                                                  | 97.90           | 27.0 QP                 | 43.5           | -16.5       | 1.50 V             | 148                  | 40.5             | -13.5                    |
| 3                                                  | 170.65          | 28.6 QP                 | 43.5           | -14.9       | 1.00 V             | 230                  | 37.2             | -8.6                     |
| 4                                                  | 333.61          | 28.8 QP                 | 46.0           | -17.2       | 1.00 V             | 154                  | 34.7             | -5.9                     |
| 5                                                  | 477.17          | 30.2 QP                 | 46.0           | -15.8       | 1.50 V             | 169                  | 33.6             | -3.4                     |
| 6                                                  | 551.86          | 30.2 QP                 | 46.0           | -15.8       | 1.00 V             | 124                  | 32.3             | -2.1                     |

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



#### 7.4 Unwanted Emissions above 1 GHz

|                        |                |                                          |                                                                      |
|------------------------|----------------|------------------------------------------|----------------------------------------------------------------------|
| <b>RF Mode</b>         | 802.11b        | <b>Channel</b>                           | CH 13 : 2472 MHz                                                     |
| <b>Frequency Range</b> | 1 GHz ~ 25 GHz | <b>Detector Function &amp; Bandwidth</b> | PK: RB=1 MHz, VB=3 MHz, DET=Peak<br>AV: RB=1 MHz, VB=10 Hz, DET=Peak |
| <b>Input Power</b>     | 120 Vac, 60 Hz | <b>Environmental Conditions</b>          | 23 °C, 67 % RH                                                       |
| <b>Tested By</b>       | Adair Peng     |                                          |                                                                      |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | *2472.00        | 102.5 PK                |                |             | 1.69 H             | 326                  | 68.9             | 33.6                     |
| 2                                                    | *2472.00        | 99.9 AV                 |                |             | 1.69 H             | 326                  | 66.3             | 33.6                     |
| 3                                                    | 2488.90         | 60.9 PK                 | 74.0           | -13.1       | 1.69 H             | 326                  | 27.3             | 33.6                     |
| 4                                                    | 2488.90         | 49.8 AV                 | 54.0           | -4.2        | 1.69 H             | 326                  | 16.2             | 33.6                     |
| 5                                                    | 4944.00         | 50.9 PK                 | 74.0           | -23.1       | 1.93 H             | 66                   | 40.6             | 10.3                     |
| 6                                                    | 4944.00         | 38.7 AV                 | 54.0           | -15.3       | 1.93 H             | 66                   | 28.4             | 10.3                     |
| Antenna Polarity & Test Distance : Vertical at 3 m   |                 |                         |                |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | *2472.00        | 97.0 PK                 |                |             | 3.29 V             | 343                  | 63.4             | 33.6                     |
| 2                                                    | *2472.00        | 94.4 AV                 |                |             | 3.29 V             | 343                  | 60.8             | 33.6                     |
| 3                                                    | 2488.90         | 60.2 PK                 | 74.0           | -13.8       | 3.29 V             | 343                  | 26.6             | 33.6                     |
| 4                                                    | 2488.90         | 48.3 AV                 | 54.0           | -5.7        | 3.29 V             | 343                  | 14.7             | 33.6                     |
| 5                                                    | 4944.00         | 51.3 PK                 | 74.0           | -22.7       | 3.39 V             | 328                  | 41.0             | 10.3                     |
| 6                                                    | 4944.00         | 39.4 AV                 | 54.0           | -14.6       | 3.39 V             | 328                  | 29.1             | 10.3                     |

#### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency, the limit was restricted at the RF Output Power.

|                 |                |                               |                                                                      |
|-----------------|----------------|-------------------------------|----------------------------------------------------------------------|
| RF Mode         | VHT20          | Channel                       | CH 13 : 2472 MHz                                                     |
| Frequency Range | 1 GHz ~ 25 GHz | Detector Function & Bandwidth | PK: RB=1 MHz, VB=3 MHz, DET=Peak<br>AV: RB=1 MHz, VB=10 Hz, DET=Peak |
| Input Power     | 120 Vac, 60 Hz | Environmental Conditions      | 23 °C, 67 % RH                                                       |
| Tested By       | Adair Peng     |                               |                                                                      |

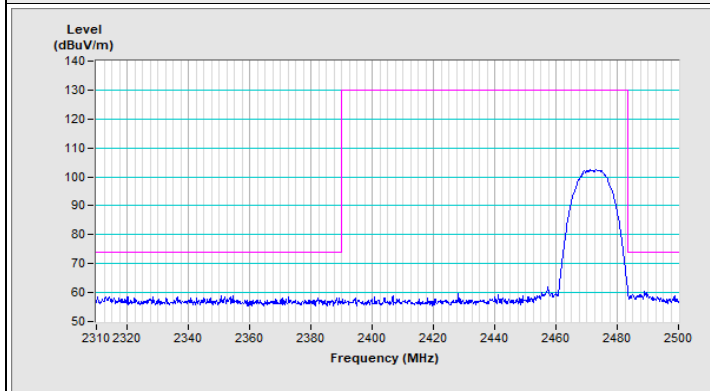
| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | *2472.00        | 107.4 PK                |                |             | 1.75 H             | 330                  | 73.8             | 33.6                     |
| 2                                                    | *2472.00        | 97.5 AV                 |                |             | 1.75 H             | 330                  | 63.9             | 33.6                     |
| 3                                                    | 2483.50         | 70.8 PK                 | 74.0           | -3.2        | 1.75 H             | 330                  | 37.2             | 33.6                     |
| 4                                                    | <b>2483.50</b>  | <b>53.0 AV</b>          | <b>54.0</b>    | <b>-1.0</b> | <b>1.75 H</b>      | <b>330</b>           | <b>19.4</b>      | <b>33.6</b>              |
| 5                                                    | 4944.00         | 50.6 PK                 | 74.0           | -23.4       | 1.61 H             | 291                  | 40.3             | 10.3                     |
| 6                                                    | 4944.00         | 37.1 AV                 | 54.0           | -16.9       | 1.61 H             | 291                  | 26.8             | 10.3                     |
| Antenna Polarity & Test Distance : Vertical at 3 m   |                 |                         |                |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | *2472.00        | 99.8 PK                 |                |             | 2.20 V             | 165                  | 66.2             | 33.6                     |
| 2                                                    | *2472.00        | 90.5 AV                 |                |             | 2.20 V             | 165                  | 56.9             | 33.6                     |
| 3                                                    | 2483.50         | 63.9 PK                 | 74.0           | -10.1       | 2.20 V             | 165                  | 30.3             | 33.6                     |
| 4                                                    | 2483.50         | 48.8 AV                 | 54.0           | -5.2        | 2.20 V             | 165                  | 15.2             | 33.6                     |
| 5                                                    | 4944.00         | 50.0 PK                 | 74.0           | -24.0       | 1.85 V             | 102                  | 39.7             | 10.3                     |
| 6                                                    | 4944.00         | 36.9 AV                 | 54.0           | -17.1       | 1.85 V             | 102                  | 26.6             | 10.3                     |

**Remarks:**

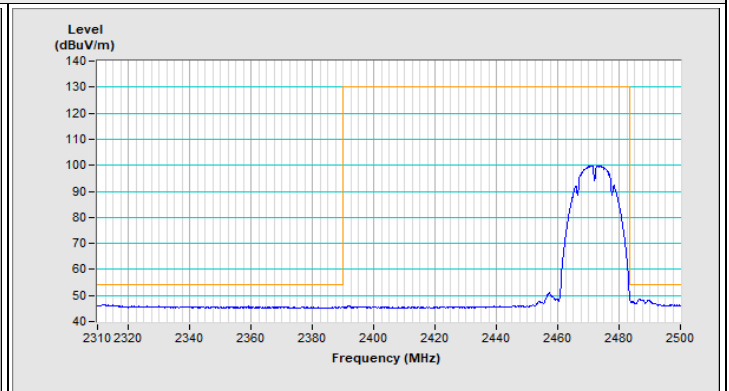
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency, the limit was restricted at the RF Output Power.

|                 |                    |                               |                                                                      |
|-----------------|--------------------|-------------------------------|----------------------------------------------------------------------|
| Frequency Range | 2.31 GHz ~ 2.5 GHz | Detector Function & Bandwidth | PK: RB=1 MHz, VB=3 MHz, DET=Peak<br>AV: RB=1 MHz, VB=10 Hz, DET=Peak |
|-----------------|--------------------|-------------------------------|----------------------------------------------------------------------|

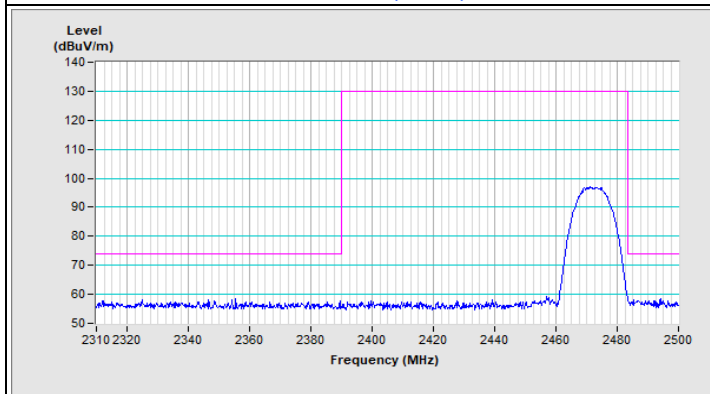
### 802.11b Channel 13



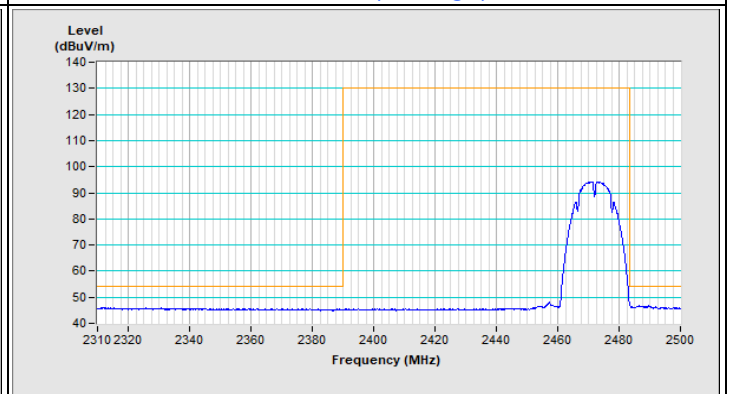
Horizontal (Peak)



Horizontal (Average)

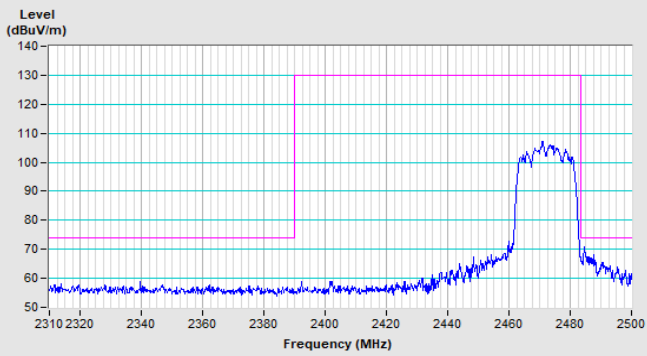


Vertical (Peak)

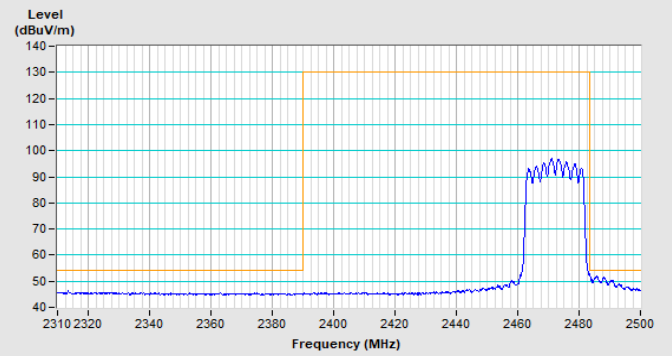


Vertical (Average)

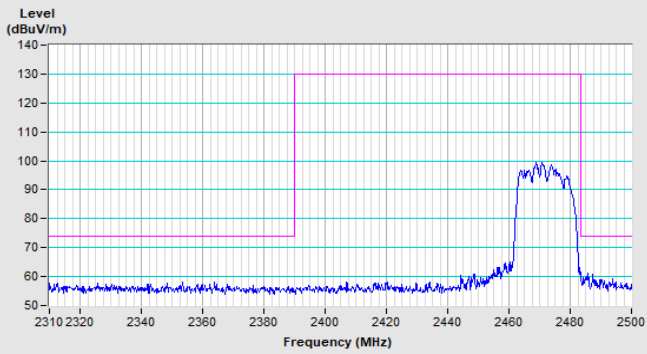
### VHT20 Channel 13



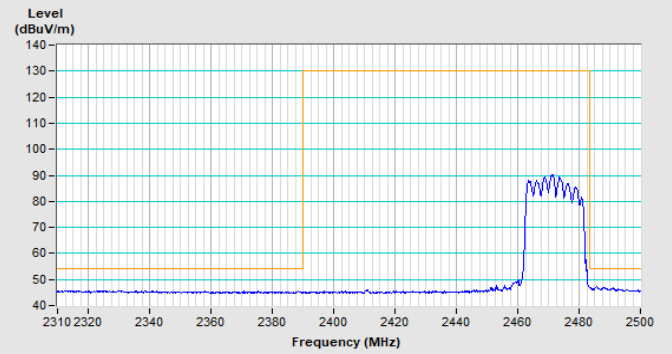
Horizontal (Peak)



Horizontal (Average)



Vertical (Peak)



Vertical (Average)

## 8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

## 9 Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

**Lin Kou EMC/RF Lab**

Tel: 886-2-26052180

Fax: 886-2-26051924

**Hsin Chu EMC/RF/Telecom Lab**

Tel: 886-3-6668565

Fax: 886-3-6668323

**Hwa Ya EMC/RF/Safety Lab**

Tel: 886-3-3183232

Fax: 886-3-3270892

**Email:** [service.adt@bureauveritas.com](mailto:service.adt@bureauveritas.com)

**Web Site:** <http://ee.bureauveritas.com.tw>

The address and road map of all our labs can be found in our web site also.

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