

## FCC Test Report (Co-Located)

**Report No.:** RF191104C18-3

**FCC ID:** 2ACTO-APX320X

**Test Model:** APX 320X

**Received Date:** Nov. 04, 2019

**Test Date:** Feb. 26, 2020

**Issued Date:** Apr. 01, 2020

**Applicant:** Sophos Ltd

**Address:** The Pentagon, Abingdon Science Park, Abingdon OX14 3YP, United Kingdom Of Great Britain And Northern Ireland

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Lin Kou Laboratories

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**FCC Registration / Designation Number:** 788550 / TW0003



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### Release Control Record

| Issue No.     | Description      | Date Issued   |
|---------------|------------------|---------------|
| RF191104C18-3 | Original release | Apr. 01, 2020 |

## 1 Certificate of Conformity

**Product:** Sophos Access Point

**Brand:** Sophos

**Test Model:** APX 320X

**Sample Status:** Engineering sample

**Applicant:** Sophos Ltd

**Test Date:** Feb. 26, 2020

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
47 CFR FCC Part 15, Subpart E (Section 15.407)  
ANSI C63.10-2013

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.

**Prepared by :** Pettie Chen, **Date:** Apr. 01, 2020  
Pettie Chen / Senior Specialist

**Approved by :** Bruce Chen, **Date:** Apr. 01, 2020  
Bruce Chen / Senior Project Engineer

## 2 Summary of Test Results

| Applied Standard:                                                | 47 CFR FCC Part 15, Subpart C (Section 15.247)<br>47 CFR FCC Part 15, Subpart E (Section 15.407) |        |                                                                                   |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------|-----------------------------------------------------------------------------------|
| FCC Clause                                                       | Test Item                                                                                        | Result | Remarks                                                                           |
| 15.205 / 15.209 /<br>15.247(d)<br>15.407(b)<br>(1/2/3/4(i/ii)/6) | Radiated Emissions                                                                               | Pass   | Meet the requirement of limit.<br>Minimum passing margin is -1.8dB at 5470.00MHz. |

Note: 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:

| Measurement                    | Frequency        | Expanded Uncertainty (k=2) ( $\pm$ ) |
|--------------------------------|------------------|--------------------------------------|
| Radiated Emissions up to 1 GHz | 9kHz ~ 30MHz     | 3.04 dB                              |
|                                | 30MHz ~ 200MHz   | 3.59 dB                              |
|                                | 200MHz ~ 1000MHz | 3.60 dB                              |
| Radiated Emissions above 1 GHz | 1GHz ~ 18GHz     | 2.29 dB                              |
|                                | 18GHz ~ 40GHz    | 2.29 dB                              |

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

|                       |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product               | Sophos Access Point |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Brand                 | Sophos              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Test Model            | APX 320X            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Sample Status         | Engineering sample  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Power Supply Rating   | 55Vdc (PoE)         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Modulation Type       | WLAN                | CCK, DQPSK, DBPSK for DSSS<br>256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                       | Bluetooth LE        | GFSK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Modulation Technology | WLAN                | DSSS, OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Transfer Rate         | WLAN                | 802.11b: 11/5.5/2/1Mbps<br>802.11g: 54/48/36/24/18/12/9/6Mbps<br>802.11a: 54/48/36/24/18/12/9/6Mbps<br>802.11n: up to 300Mbps<br>802.11ac: up to 867Mbps                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                       | Bluetooth LE        | 1Mbps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Operating Frequency   | WLAN                | 2.4GHz: 2412~2462MHz<br>5.0GHz: 5180~5240MHz, 5260~5320MHz, 5500~5720MHz,<br>5745~5825MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                       | Bluetooth LE        | 2402 ~ 2480MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Number of Channel     | WLAN                | 2412 ~ 2462MHz:<br>802.11b, 802.11g, 802.11n (HT20): 11<br>802.11n (HT40): 7<br>5180 ~ 5240MHz:<br>802.11a, 802.11n (HT20), 802.11ac (VHT20): 4<br>802.11n (HT40), 802.11ac (VHT40): 2<br>802.11ac (VHT80): 1<br>5260 ~ 5320MHz:<br>802.11a, 802.11n (HT20), 802.11ac (VHT20): 4<br>802.11n (HT40), 802.11ac (VHT40): 2<br>802.11ac (VHT80): 1<br>5500 ~ 5700MHz:<br>802.11a, 802.11n (HT20), 802.11ac (VHT20): 11<br>802.11n (HT40), 802.11ac (VHT40): 5<br>802.11ac (VHT80): 2<br>5745 ~ 5825MHz:<br>802.11a, 802.11n (HT20), 802.11ac (VHT20): 5<br>802.11n (HT40), 802.11ac (VHT40): 2<br>802.11ac (VHT80): 1 |
|                       | Bluetooth LE        | 40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Output Power        | WLAN          |                  | Dipole antenna | Directional antenna | Sector antenna |
|---------------------|---------------|------------------|----------------|---------------------|----------------|
|                     |               | CDD Mode         |                |                     |                |
|                     |               | 2412 ~ 2462MHz   | 576.047mW      | 249.141mW           | 249.141mW      |
|                     |               | 5180 ~ 5240MHz   | 140.275mW      | 6.953mW             | 6.953mW        |
|                     |               | 5260 ~ 5320MHz   | 220.863mW      | 51.488mW            | 51.488mW       |
|                     |               | 5500 ~ 5700MHz   | 183.736mW      | 49.191mW            | 49.191mW       |
|                     |               | 5745 ~ 5825MHz   | 198.616mW      | 189.930mW           | 189.930mW      |
|                     |               | Beamforming Mode |                |                     |                |
|                     |               | 2412 ~ 2462MHz   | 447.495mW      | 124.867mW           | 124.867mW      |
|                     |               | 5180 ~ 5240MHz   | 69.735mW       | 3.445mW             | 3.445mW        |
|                     |               | 5260 ~ 5320MHz   | 156.359mW      | 25.805mW            | 25.805mW       |
|                     |               | 5500 ~ 5700MHz   | 130.743mW      | 24.654mW            | 24.654mW       |
|                     |               | 5745 ~ 5825MHz   | 198.616mW      | 95.379mW            | 95.379mW       |
|                     | Bluetooth LE  | 7.129mW          |                |                     |                |
| Antenna Type        | Refer to Note |                  |                |                     |                |
| Antenna Connector   | Refer to Note |                  |                |                     |                |
| Accessory Device    | NA            |                  |                |                     |                |
| Data Cable Supplied | NA            |                  |                |                     |                |

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

| 2.4GHz Band      |             |             |
|------------------|-------------|-------------|
| Modulation Mode  | TX Function | Beamforming |
| 802.11b          | 2TX         | Not Support |
| 802.11g          | 2TX         | Not Support |
| 802.11n (HT20)   | 2TX         | Support     |
| 802.11n (HT40)   | 2TX         | Support     |
| 5GHz Band        |             |             |
| Modulation Mode  | TX Function | Beamforming |
| 802.11a          | 2TX         | Not Support |
| 802.11n (HT20)   | 2TX         | Support     |
| 802.11n (HT40)   | 2TX         | Support     |
| 802.11ac (VHT20) | 2TX         | Support     |
| 802.11ac (VHT40) | 2TX         | Support     |
| 802.11ac (VHT80) | 2TX         | Support     |

2. The EUT uses the following PoE. (Support unit only)

|              |                           |
|--------------|---------------------------|
| Brand        | Microsemi                 |
| Model        | PD-9001GR/AC              |
| Input Power  | 100-240Vac~50/60Hz, 0.67A |
| Output Power | 55Vdc / 0.6A              |

3. The EUT uses the following antennas.

| NO. | Type        | Gain(dBi) |          |          |          |          |          |          |          | Connector |
|-----|-------------|-----------|----------|----------|----------|----------|----------|----------|----------|-----------|
|     |             | 2400 MHz  | 2450 MHz | 2500 MHz | 5150 MHz | 5325 MHz | 5500 MHz | 5675 MHz | 5850 MHz |           |
| 1   | Dipole      | 3.1       | 3.2      | 3.1      | 5.1      | 5.0      | 5.6      | 5.7      | 6.0      | N type    |
| 2   | Directional | 11.6      | 12.0     | 11.9     | 10.55    | 11.2     | 11.5     | 11.2     | 11.5     | N type    |
| 3   | Sector      | 10.6      | 11.4     | 11.2     | 12.57    | 12.7     | 13.0     | 12.4     | 13.1     | N type    |

### 3.2 Description of Test Modes

#### For 2.4GHz

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

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

7 channels are provided for 802.11n (HT40):

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

#### For 5180~5240MHz:

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 36      | 5180 MHz  | 44      | 5220 MHz  |
| 40      | 5200 MHz  | 48      | 5240 MHz  |

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 38      | 5190 MHz  | 46      | 5230 MHz  |

1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency |
|---------|-----------|
| 42      | 5210MHz   |

#### For 5260 ~ 5320MHz:

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 52      | 5260 MHz  | 60      | 5300 MHz  |
| 56      | 5280 MHz  | 64      | 5320 MHz  |

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 54      | 5270 MHz  | 62      | 5310 MHz  |

1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency |
|---------|-----------|
| 58      | 5290 MHz  |

#### For 5500 ~ 5700MHz:

11 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 100     | 5500 MHz  | 124     | 5620 MHz  |
| 104     | 5520 MHz  | 128     | 5640 MHz  |
| 108     | 5540 MHz  | 132     | 5660 MHz  |
| 112     | 5560 MHz  | 136     | 5680 MHz  |
| 116     | 5580 MHz  | 140     | 5700 MHz  |
| 120     | 5600 MHz  |         |           |

5 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 102     | 5510 MHz  | 126     | 5630 MHz  |
| 110     | 5550 MHz  | 134     | 5670 MHz  |
| 118     | 5590 MHz  |         |           |

2 channels are provided for 802.11ac (VHT80):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 106     | 5530 MHz  | 122     | 5610      |

For 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 149     | 5745 MHz  | 161     | 5805 MHz  |
| 153     | 5765 MHz  | 165     | 5825 MHz  |
| 157     | 5785 MHz  |         |           |

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 151     | 5755 MHz  | 159     | 5795 MHz  |

1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency |
|---------|-----------|
| 155     | 5775 MHz  |

### 3.2.1 Test Mode Applicability and Tested Channel Detail

| EUT Configure Mode | Applicable to |       | Description             |
|--------------------|---------------|-------|-------------------------|
|                    | RE $\geq$ 1G  | RE<1G |                         |
| -                  | √             | √     | EUT with Sector antenna |

Where RE $\geq$ 1G: Radiated Emission above 1GHz RE<1G: Radiated Emission below 1GHz

Note: The antenna had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.

#### Radiated Emission Test (Above 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT Configure Mode | Mode                               | Freq. Range (MHz) | Available Channel | Tested Channel | Modulation Technology |
|--------------------|------------------------------------|-------------------|-------------------|----------------|-----------------------|
| -                  | BT LE + 802.11g + 802.11ac (VHT20) | 2400-2480         | 0 to 39           | 39 + 6 + 48    | GFSK                  |
|                    |                                    | 2412-2462         | 1 to 11           |                | OFDM                  |
|                    |                                    | 5180-5240         | 36 to 48          |                | OFDM                  |
|                    |                                    | 5260-5320         | 52 to 64          |                |                       |
| -                  | BT LE + 802.11ac (VHT20) + 802.11a | 2400-2480         | 0 to 39           | 39 + 48 + 100  | GFSK                  |
|                    |                                    | 5180-5240         | 36 to 48          |                | OFDM                  |
|                    |                                    | 5260-5320         | 52 to 64          |                |                       |
|                    |                                    | 5500-5700         | 100 to 140        |                | OFDM                  |
|                    |                                    | 5745-5825         | 149 to 165        |                |                       |

#### Radiated Emission Test (Below 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT Configure Mode | Mode                               | Freq. Range (MHz) | Available Channel | Tested Channel | Modulation Technology |
|--------------------|------------------------------------|-------------------|-------------------|----------------|-----------------------|
| -                  | BT LE + 802.11g + 802.11ac (VHT20) | 2400-2480         | 0 to 39           | 39 + 6 + 48    | GFSK                  |
|                    |                                    | 2412-2462         | 1 to 11           |                | OFDM                  |
|                    |                                    | 5180-5240         | 36 to 48          |                | OFDM                  |
|                    |                                    | 5260-5320         | 52 to 64          |                |                       |
| -                  | BT LE + 802.11ac (VHT20) + 802.11a | 2400-2480         | 0 to 39           | 39 + 48 + 100  | GFSK                  |
|                    |                                    | 5180-5240         | 36 to 48          |                | OFDM                  |
|                    |                                    | 5260-5320         | 52 to 64          |                |                       |
|                    |                                    | 5500-5700         | 100 to 140        |                | OFDM                  |
|                    |                                    | 5745-5825         | 149 to 165        |                |                       |

#### Test Condition:

| Applicable to | Environmental Conditions | Input Power  | Tested by |
|---------------|--------------------------|--------------|-----------|
| RE $\geq$ 1G  | 22 deg. C, 67% RH        | 120Vac, 60Hz | Greg Lin  |
| RE<1G         | 22 deg. C, 67% RH        | 120Vac, 60Hz | Greg Lin  |

### 3.3 Description of Support Units

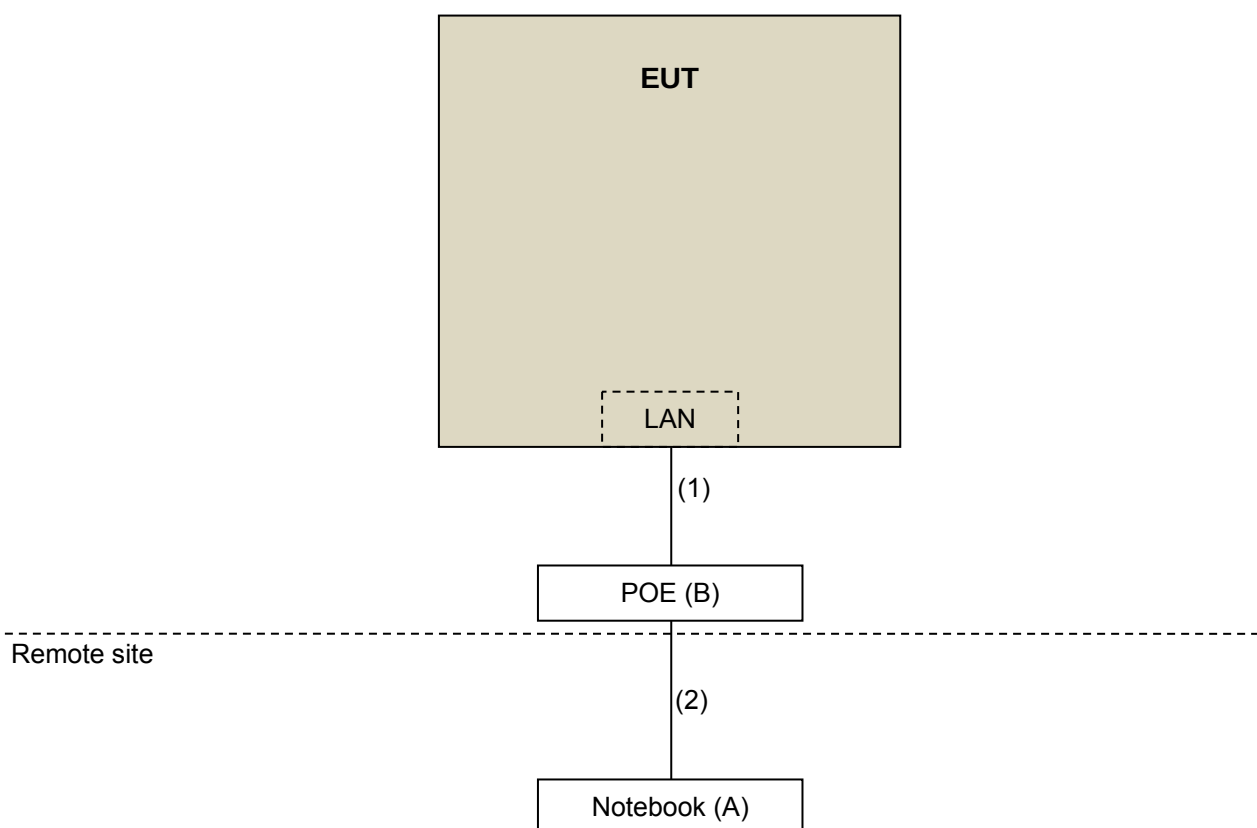
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| ID | Product  | Brand     | Model No.    | Serial No. | FCC ID | Remarks |
|----|----------|-----------|--------------|------------|--------|---------|
| A. | Notebook | Lenovo    | 80Q7         | PF0KUGU6   | NA     | -       |
| B. | PoE      | Microsemi | PD-9001GR/AC | NA         | NA     | -       |

Note: All power cords of the above support units are non-shielded (1.8m).

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|----|--------------|------|------------|--------------------|--------------|---------|
| 1. | RJ45 cable   | 1    | 2          | N                  | 0            | -       |
| 2. | RJ45 cable   | 1    | 10         | N                  | 0            | -       |

#### 3.3.1 Configuration of System under Test



### **3.4 General Description of Applied Standards**

The EUT is a RF Product. According to the specification of the EUT declared by the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C (15.247)**

**FCC Part 15, Subpart E (15.407)**

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

## 4 Test Types and Results

### 4.1 Radiated Emission and Bandedge Measurement

#### 4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

| 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                             |

Note:

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 1000MHz, 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 20dB under any condition of modulation.

Limits of unwanted emission out of the restricted bands

| Applicable To                                                                                    |                                                     | Limit                                                                                                                                   |                                                                                                                                           |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| 789033 D02 General UNII Test Procedure<br>New Rules v02r01                                       |                                                     | Field Strength at 3m                                                                                                                    |                                                                                                                                           |
|                                                                                                  |                                                     | PK: 74 (dBuV/m)                                                                                                                         | AV: 54 (dBuV/m)                                                                                                                           |
| Frequency Band                                                                                   | Applicable To                                       | EIRP Limit                                                                                                                              | Equivalent Field Strength at 3m                                                                                                           |
| 5150~5250 MHz                                                                                    | 15.407(b)(1)                                        | PK: -27 (dBm/MHz)                                                                                                                       | PK: 68.2(dBuV/m)                                                                                                                          |
| 5250~5350 MHz                                                                                    | 15.407(b)(2)                                        |                                                                                                                                         |                                                                                                                                           |
| 5470~5725 MHz                                                                                    | 15.407(b)(3)                                        |                                                                                                                                         |                                                                                                                                           |
| 5725~5850 MHz                                                                                    | <input checked="" type="checkbox"/> 15.407(b)(4)(i) | PK: -27 (dBm/MHz) <sup>*1</sup><br>PK: 10 (dBm/MHz) <sup>*2</sup><br>PK: 15.6 (dBm/MHz) <sup>*3</sup><br>PK: 27 (dBm/MHz) <sup>*4</sup> | PK: 68.2(dBuV/m) <sup>*1</sup><br>PK: 105.2 (dBuV/m) <sup>*2</sup><br>PK: 110.8(dBuV/m) <sup>*3</sup><br>PK: 122.2 (dBuV/m) <sup>*4</sup> |
|                                                                                                  | <input type="checkbox"/> 15.407(b)(4)(ii)           | Emission limits in section 15.247(d)                                                                                                    |                                                                                                                                           |
| <sup>*1</sup> beyond 75 MHz or more above of the band edge.                                      |                                                     | <sup>*2</sup> below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.                                                    |                                                                                                                                           |
| <sup>*3</sup> below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. |                                                     | <sup>*4</sup> from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.                    |                                                                                                                                           |

Note: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000 \sqrt{30P}}{3} \mu\text{V/m, where } P \text{ is the eirp (Watts).}$$

#### 4.1.2 Test Instruments

| Description & Manufacturer               | Model No.                          | Serial No.                                          | Cal. Date                      | Cal. Due                       |
|------------------------------------------|------------------------------------|-----------------------------------------------------|--------------------------------|--------------------------------|
| Test Receiver<br>KEYSIGHT                | N9038A                             | MY55420137                                          | Apr. 15, 2019                  | Apr. 14, 2020                  |
| Spectrum Analyzer<br>ROHDE & SCHWARZ     | FSP40                              | 100039                                              | Jun. 12, 2019                  | Jun. 11, 2020                  |
| BILOG Antenna<br>SCHWARZBECK             | VULB9168                           | 9168-160                                            | Nov. 07, 2019                  | Nov. 06, 2020                  |
| HORN Antenna<br>SCHWARZBECK              | BBHA 9120 D                        | 9120D-1169                                          | Nov. 25, 2018<br>Nov. 24, 2019 | Nov. 24, 2019<br>Nov. 23, 2020 |
| HORN Antenna<br>SCHWARZBECK              | BBHA 9170                          | BBHA9170241                                         | Nov. 25, 2018<br>Nov. 24, 2019 | Nov. 24, 2019<br>Nov. 23, 2020 |
| Preamplifier<br>Agilent<br>(Below 1GHz)  | 8447D                              | 2944A10638                                          | Jul. 11, 2019                  | Jul. 10, 2020                  |
| Preamplifier<br>Agilent<br>(Above 1GHz)  | 8449B                              | 3008A02367                                          | Feb. 19, 2019<br>Feb. 18, 2020 | Feb. 18, 2020<br>Feb. 17, 2021 |
| RF signal cable<br>HUBER+SUHNER&EMCI     | SUCOFLEX 104 &<br>EMC104-SM-SM8000 | CABLE-CH9-02<br>(248780+171006)                     | Jan. 19, 2019<br>Jan. 18, 2020 | Jan. 18, 2020<br>Jan. 17, 2021 |
| RF signal cable<br>HUBER+SUHNER          | SUCOFLEX 104                       | CABLE-CH9-(250795/4)                                | Jul. 11, 2019                  | Jul. 10, 2020                  |
| RF signal cable<br>Woken                 | 8D-FB                              | Cable-CH9-01                                        | Jul. 30, 2019                  | Jul. 29, 2020                  |
| Software<br>BV ADT                       | ADT_Radiated_<br>V7.6.15.9.5       | NA                                                  | NA                             | NA                             |
| Antenna Tower<br>EMCO                    | 2070/2080                          | 512.835.4684                                        | NA                             | NA                             |
| Turn Table<br>EMCO                       | 2087-2.03                          | NA                                                  | NA                             | NA                             |
| Antenna Tower & Turn<br>BV ADT           | AT100                              | AT93021705                                          | NA                             | NA                             |
| Turn Table<br>BV ADT                     | TT100                              | TT93021705                                          | NA                             | NA                             |
| Turn Table Controller<br>BV ADT          | SC100                              | SC93021705                                          | NA                             | NA                             |
| Boresight Antenna Fixture                | FBA-01                             | FBA-SIP01                                           | NA                             | NA                             |
| Pre-amplifier<br>(18GHz-40GHz)<br>EMC    | EMC184045B                         | 980175                                              | Sep. 05, 2019                  | Sep. 04, 2020                  |
| USB Wideband Power<br>Sensor<br>KEYSIGHT | U2021XA                            | MY55050005/MY55190<br>004/MY55190007/MY55<br>210005 | Jul. 15, 2019                  | Jul. 14, 2020                  |

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. The test was performed in HwaYa Chamber 9.

#### 4.1.3 Test Procedures

##### For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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.

##### Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

##### For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) 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.
- f. The test-receiver system was set to peak and average detect 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.

##### Note:

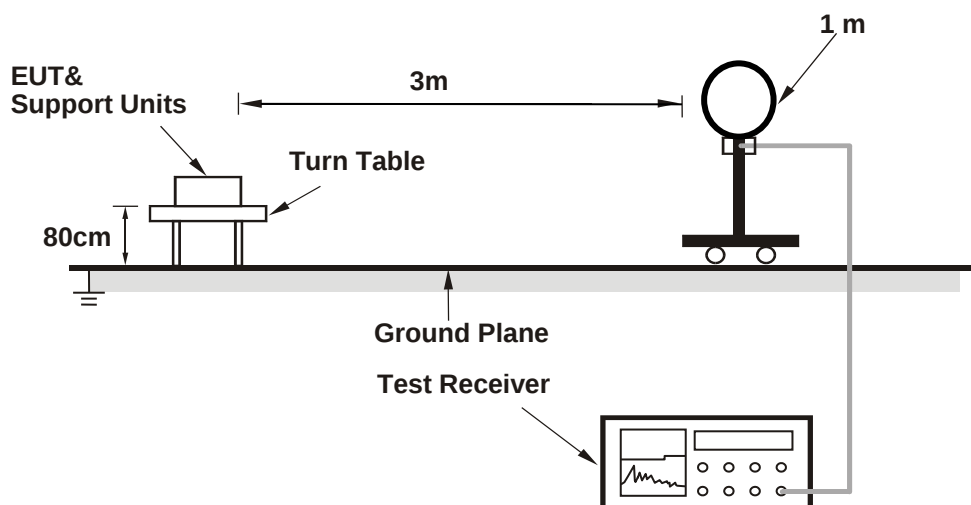
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) or 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

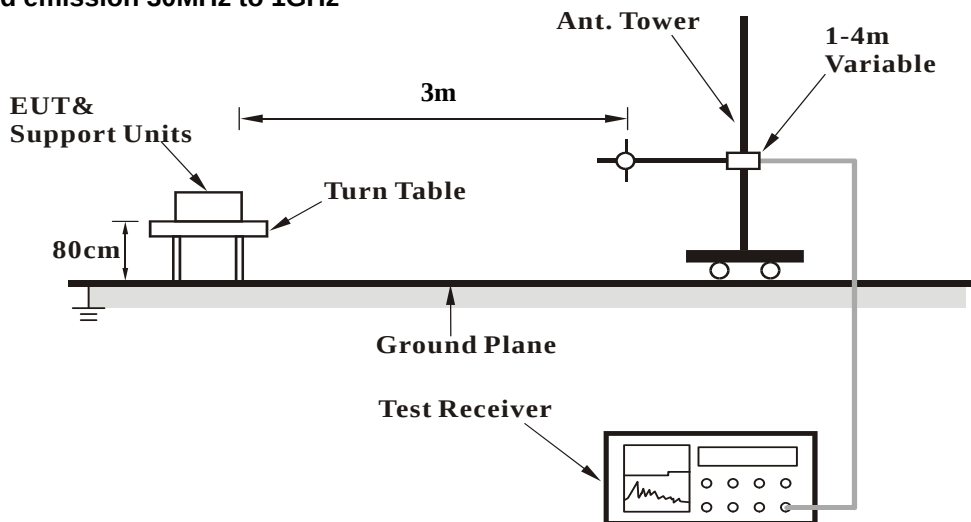
No deviation.

#### 4.1.5 Test Setup

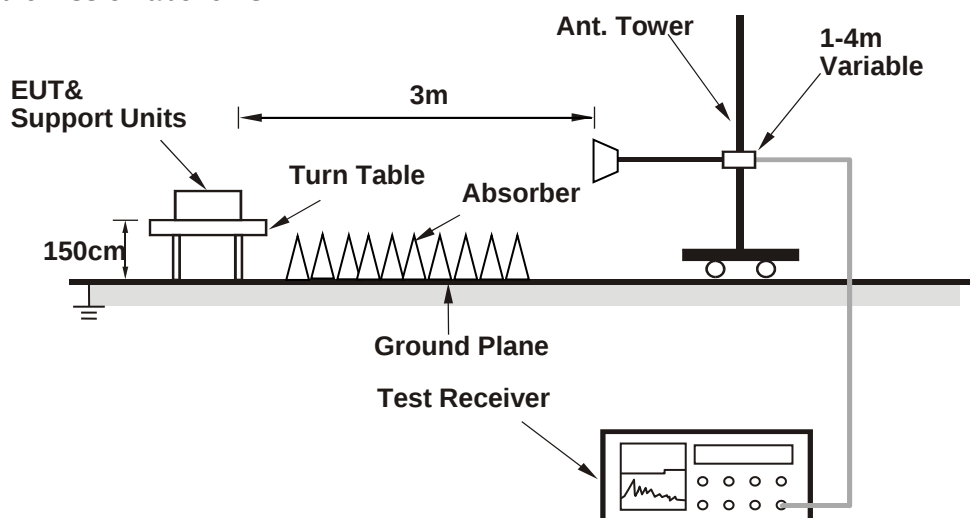
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



### For Radiated emission above 1GHz



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

#### 4.1.6 EUT Operating Conditions

- Placed the EUT on the testing table.
- Prepared a notebook to act as a communication partner and placed it outside of testing area.
- The communication partner connected with EUT via a RJ45 cable and ran a test program (QRCT3) to enable EUT under transmission condition continuously at specific channel frequency.
- The communication partner sent data to EUT by command "PING".

#### 4.1.7 Test Results

Above 1GHz Data:

BT LE + 802.11g + 802.11ac (VHT20)

|                 |                      |                   |                           |
|-----------------|----------------------|-------------------|---------------------------|
| CHANNEL         | CH 39 + CH 6 + CH 48 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
| FREQUENCY RANGE | 1GHz ~ 40GHz         |                   |                           |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|-----------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.                                                 | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1                                                   | *2437.00    | 124.1 PK                |                |             | 1.67 H             | 7                    | 93.0             | 31.1                     |
| 2                                                   | *2437.00    | 113.6 AV                |                |             | 1.67 H             | 7                    | 82.5             | 31.1                     |
| 3                                                   | *2480.00    | 100.5 PK                |                |             | 2.63 H             | 4                    | 69.4             | 31.1                     |
| 4                                                   | *2480.00    | 95.7 AV                 |                |             | 2.63 H             | 4                    | 64.6             | 31.1                     |
| 5                                                   | 2483.50     | 57.4 PK                 | 74.0           | -16.6       | 3.05 H             | 348                  | 26.2             | 31.2                     |
| 6                                                   | 2483.50     | 46.8 AV                 | 54.0           | -7.2        | 3.05 H             | 348                  | 15.6             | 31.2                     |
| 7                                                   | 4874.00     | 56.9 PK                 | 74.0           | -17.1       | 1.96 H             | 186                  | 54.9             | 2.0                      |
| 8                                                   | 4874.00     | 42.9 AV                 | 54.0           | -11.1       | 1.96 H             | 186                  | 40.9             | 2.0                      |
| 9                                                   | 4960.00     | 44.6 PK                 | 74.0           | -29.4       | 1.58 H             | 47                   | 42.3             | 2.3                      |
| 10                                                  | 4960.00     | 32.1 AV                 | 54.0           | -21.9       | 1.58 H             | 47                   | 29.8             | 2.3                      |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |                         |                |             |                    |                      |                  |                          |
| NO.                                                 | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1                                                   | *2437.00    | 122.1 PK                |                |             | 1.69 V             | 10                   | 91.0             | 31.1                     |
| 2                                                   | *2437.00    | 111.8 AV                |                |             | 1.69 V             | 10                   | 80.7             | 31.1                     |
| 3                                                   | *2480.00    | 105.7 PK                |                |             | 1.72 V             | 71                   | 74.6             | 31.1                     |
| 4                                                   | *2480.00    | 100.9 AV                |                |             | 1.72 V             | 71                   | 69.8             | 31.1                     |
| 5                                                   | 2483.50     | 61.5 PK                 | 74.0           | -12.5       | 1.86 V             | 64                   | 30.3             | 31.2                     |
| 6                                                   | 2483.50     | 50.3 AV                 | 54.0           | -3.7        | 1.86 V             | 64                   | 19.1             | 31.2                     |
| 7                                                   | 4874.00     | 58.4 PK                 | 74.0           | -15.6       | 3.42 V             | 182                  | 56.4             | 2.0                      |
| 8                                                   | 4874.00     | 44.3 AV                 | 54.0           | -9.7        | 3.42 V             | 182                  | 42.3             | 2.0                      |
| 9                                                   | 4960.00     | 44.8 PK                 | 74.0           | -29.2       | 2.38 V             | 56                   | 42.5             | 2.3                      |
| 10                                                  | 4960.00     | 32.3 AV                 | 54.0           | -21.7       | 2.38 V             | 56                   | 30.0             | 2.3                      |

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

|                 |                      |                   |                           |
|-----------------|----------------------|-------------------|---------------------------|
| CHANNEL         | CH 39 + CH 6 + CH 48 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
| FREQUENCY RANGE | 1GHz ~ 40GHz         |                   |                           |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|-----------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.                                                 | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1                                                   | *5240.00    | 123.6 PK                |                |             | 1.74 H             | 11                   | 87.5             | 36.1                     |
| 2                                                   | *5240.00    | 112.6 AV                |                |             | 1.74 H             | 11                   | 76.5             | 36.1                     |
| 3                                                   | 5350.00     | 54.4 PK                 | 74.0           | -19.6       | 1.67 H             | 7                    | 52.4             | 2.0                      |
| 4                                                   | 5350.00     | 42.3 AV                 | 54.0           | -11.7       | 1.67 H             | 7                    | 40.3             | 2.0                      |
| 5                                                   | #10480.00   | 56.7 PK                 | 68.2           | -11.5       | 1.43 H             | 118                  | 41.6             | 15.1                     |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |                         |                |             |                    |                      |                  |                          |
| NO.                                                 | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1                                                   | *5240.00    | 125.1 PK                |                |             | 1.83 V             | 15                   | 89.0             | 36.1                     |
| 2                                                   | *5240.00    | 114.0 AV                |                |             | 1.83 V             | 15                   | 77.9             | 36.1                     |
| 3                                                   | 5350.00     | 55.1 PK                 | 74.0           | -18.9       | 1.78 V             | 9                    | 53.1             | 2.0                      |
| 4                                                   | 5350.00     | 42.7 AV                 | 54.0           | -11.3       | 1.78 V             | 9                    | 40.7             | 2.0                      |
| 5                                                   | #10480.00   | 62.1 PK                 | 68.2           | -6.1        | 2.41 V             | 226                  | 47.0             | 15.1                     |

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

BT LE + 802.11ac (VHT20) + 802.11a

|                 |                        |                   |                           |
|-----------------|------------------------|-------------------|---------------------------|
| CHANNEL         | CH 39 + CH 48 + CH 100 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
| FREQUENCY RANGE | 1GHz ~ 40GHz           |                   |                           |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|-----------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.                                                 | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1                                                   | *2480.00    | 100.4 PK                |                |             | 2.76 H             | 358                  | 69.3             | 31.1                     |
| 2                                                   | *2480.00    | 95.7 AV                 |                |             | 2.76 H             | 358                  | 64.6             | 31.1                     |
| 3                                                   | 2483.50     | 57.5 PK                 | 74.0           | -16.5       | 2.71 H             | 353                  | 26.3             | 31.2                     |
| 4                                                   | 2483.50     | 46.7 AV                 | 54.0           | -7.3        | 2.71 H             | 353                  | 15.5             | 31.2                     |
| 5                                                   | 4960.00     | 44.6 PK                 | 74.0           | -29.4       | 1.74 H             | 63                   | 42.3             | 2.3                      |
| 6                                                   | 4960.00     | 32.2 AV                 | 54.0           | -21.8       | 1.74 H             | 63                   | 29.9             | 2.3                      |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |                         |                |             |                    |                      |                  |                          |
| NO.                                                 | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1                                                   | *2480.00    | 105.7 PK                |                |             | 1.72 V             | 59                   | 74.6             | 31.1                     |
| 2                                                   | *2480.00    | 100.8 AV                |                |             | 1.72 V             | 59                   | 69.7             | 31.1                     |
| 3                                                   | 2483.50     | 61.6 PK                 | 74.0           | -12.4       | 1.79 V             | 64                   | 30.4             | 31.2                     |
| 4                                                   | 2483.50     | 50.3 AV                 | 54.0           | -3.7        | 1.79 V             | 64                   | 19.1             | 31.2                     |
| 5                                                   | 4960.00     | 45.0 PK                 | 74.0           | -29.0       | 2.33 V             | 56                   | 42.7             | 2.3                      |
| 6                                                   | 4960.00     | 32.4 AV                 | 54.0           | -21.6       | 2.33 V             | 56                   | 30.1             | 2.3                      |

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

|                 |                        |                   |                           |
|-----------------|------------------------|-------------------|---------------------------|
| CHANNEL         | CH 39 + CH 48 + CH 100 | DETECTOR FUNCTION | Peak (PK)<br>Average (AV) |
| FREQUENCY RANGE | 1GHz ~ 40GHz           |                   |                           |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|-----------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.                                                 | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1                                                   | *5240.00    | 123.3 PK                |                |             | 1.77 H             | 12                   | 87.2             | 36.1                     |
| 2                                                   | *5240.00    | 112.5 AV                |                |             | 1.77 H             | 12                   | 76.4             | 36.1                     |
| 3                                                   | 5350.00     | 54.3 PK                 | 74.0           | -19.7       | 1.73 H             | 9                    | 52.3             | 2.0                      |
| 4                                                   | 5350.00     | 42.4 AV                 | 54.0           | -11.6       | 1.73 H             | 9                    | 40.4             | 2.0                      |
| 5                                                   | 5460.00     | 57.5 PK                 | 74.0           | -16.5       | 1.81 H             | 29                   | 54.8             | 2.7                      |
| 6                                                   | 5460.00     | 45.8 AV                 | 54.0           | -8.2        | 1.81 H             | 29                   | 43.1             | 2.7                      |
| 7                                                   | #5470.00    | 63.5 PK                 | 68.2           | -4.7        | 1.71 H             | 33                   | 60.8             | 2.7                      |
| 8                                                   | *5500.00    | 117.1 PK                |                |             | 1.76 H             | 21                   | 80.1             | 37.0                     |
| 9                                                   | *5500.00    | 106.7 AV                |                |             | 1.76 H             | 21                   | 69.7             | 37.0                     |
| 10                                                  | #10480.00   | 56.8 PK                 | 68.2           | -11.4       | 1.45 H             | 117                  | 41.7             | 15.1                     |
| 11                                                  | 11000.00    | 59.4 PK                 | 74.0           | -14.6       | 1.62 H             | 127                  | 42.5             | 16.9                     |
| 12                                                  | 11000.00    | 45.9 AV                 | 54.0           | -8.1        | 1.62 H             | 127                  | 29.0             | 16.9                     |
| 13                                                  | #16500.00   | 62.3 PK                 | 68.2           | -5.9        | 3.31 H             | 293                  | 44.0             | 18.3                     |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |                         |                |             |                    |                      |                  |                          |
| NO.                                                 | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1                                                   | *5240.00    | 125.1 PK                |                |             | 1.85 V             | 13                   | 89.0             | 36.1                     |
| 2                                                   | *5240.00    | 114.2 AV                |                |             | 1.85 V             | 13                   | 78.1             | 36.1                     |
| 3                                                   | 5350.00     | 55.1 PK                 | 74.0           | -18.9       | 1.76 V             | 5                    | 53.1             | 2.0                      |
| 4                                                   | 5350.00     | 42.7 AV                 | 54.0           | -11.3       | 1.76 V             | 5                    | 40.7             | 2.0                      |
| 5                                                   | 5460.00     | 60.7 PK                 | 74.0           | -13.3       | 1.79 V             | 13                   | 58.0             | 2.7                      |
| 6                                                   | 5460.00     | 47.1 AV                 | 54.0           | -6.9        | 1.79 V             | 13                   | 44.4             | 2.7                      |
| 7                                                   | #5470.00    | <b>66.4 PK</b>          | <b>68.2</b>    | <b>-1.8</b> | <b>1.67 V</b>      | <b>11</b>            | <b>63.7</b>      | <b>2.7</b>               |
| 8                                                   | *5500.00    | 120.2 PK                |                |             | 1.84 V             | 21                   | 83.2             | 37.0                     |
| 9                                                   | *5500.00    | 109.3 AV                |                |             | 1.84 V             | 21                   | 72.3             | 37.0                     |
| 10                                                  | #10480.00   | 62.0 PK                 | 68.2           | -6.2        | 2.51 V             | 217                  | 46.9             | 15.1                     |
| 11                                                  | 11000.00    | 62.0 PK                 | 74.0           | -12.0       | 2.67 V             | 159                  | 45.1             | 16.9                     |
| 12                                                  | 11000.00    | 48.8 AV                 | 54.0           | -5.2        | 2.67 V             | 159                  | 31.9             | 16.9                     |
| 13                                                  | #16500.00   | 65.4 PK                 | 68.2           | -2.8        | 2.86 V             | 221                  | 47.1             | 18.3                     |

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Below 1GHz data

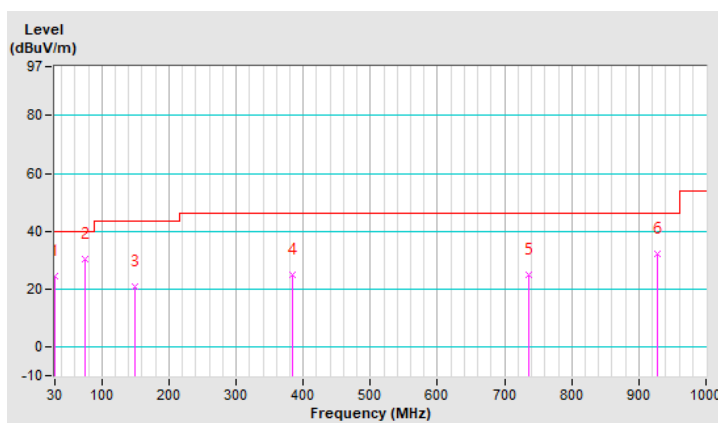
BT LE + 802.11g + 802.11ac (VHT20)

|                 |                      |                   |                 |
|-----------------|----------------------|-------------------|-----------------|
| CHANNEL         | CH 39 + CH 6 + CH 48 | DETECTOR FUNCTION | Quasi-Peak (QP) |
| FREQUENCY RANGE | 9kHz ~ 1GHz          |                   |                 |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|-----------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.                                                 | FREQ. (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       | 24.4 QP                 | 40.0           | -15.6       | 1.25 H             | 59                   | 35.7             | -11.3                    |
| 2                                                   | 74.62       | 30.3 QP                 | 40.0           | -9.7        | 1.25 H             | 111                  | 42.8             | -12.5                    |
| 3                                                   | 148.34      | 20.7 QP                 | 43.5           | -22.8       | 1.00 H             | 58                   | 30.0             | -9.3                     |
| 4                                                   | 383.08      | 24.7 QP                 | 46.0           | -21.3       | 1.50 H             | 72                   | 30.7             | -6.0                     |
| 5                                                   | 736.16      | 24.9 QP                 | 46.0           | -21.1       | 1.50 H             | 22                   | 24.7             | 0.2                      |
| 6                                                   | 928.22      | 32.1 QP                 | 46.0           | -13.9       | 1.50 H             | 52                   | 28.2             | 3.9                      |

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. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.

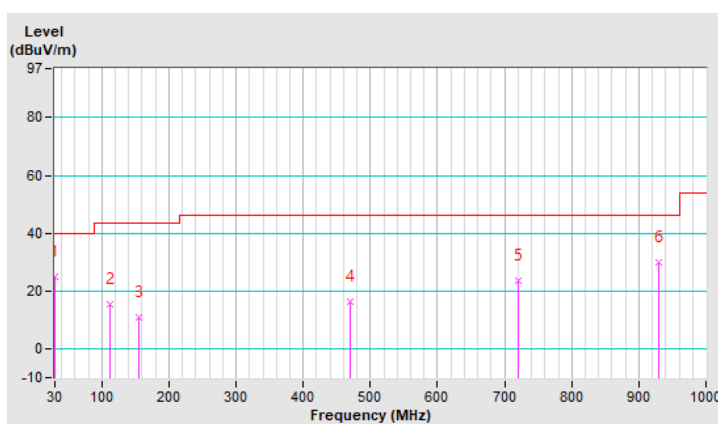


|                 |                      |                   |                 |
|-----------------|----------------------|-------------------|-----------------|
| CHANNEL         | CH 39 + CH 6 + CH 48 | DETECTOR FUNCTION | Quasi-Peak (QP) |
| FREQUENCY RANGE | 9kHz ~ 1GHz          |                   |                 |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|---------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.                                               | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1                                                 | 30.97       | 24.7 QP                 | 40.0           | -15.3       | 1.25 V             | 301                  | 36.5             | -11.8                    |
| 2                                                 | 111.48      | 15.5 QP                 | 43.5           | -28.0       | 1.25 V             | 57                   | 28.0             | -12.5                    |
| 3                                                 | 156.10      | 10.9 QP                 | 43.5           | -32.6       | 1.00 V             | 283                  | 20.1             | -9.2                     |
| 4                                                 | 470.38      | 16.5 QP                 | 46.0           | -29.5       | 1.50 V             | 50                   | 20.7             | -4.2                     |
| 5                                                 | 720.64      | 23.7 QP                 | 46.0           | -22.3       | 1.00 V             | 95                   | 23.9             | -0.2                     |
| 6                                                 | 930.16      | 29.9 QP                 | 46.0           | -16.1       | 1.50 V             | 18                   | 26.0             | 3.9                      |

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. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.



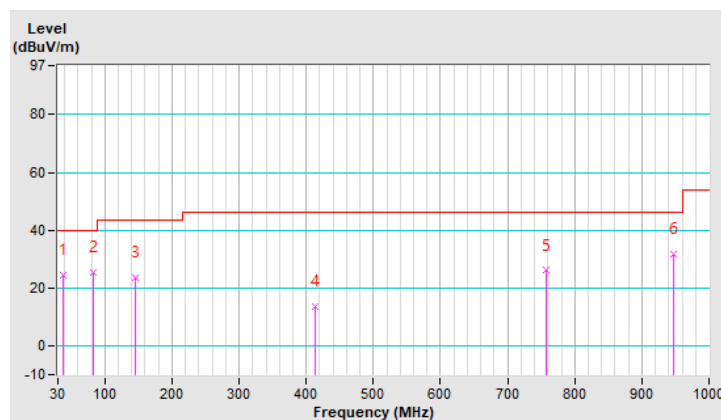
# BT LE + 802.11ac (VHT20) + 802.11a

|                 |                        |                   |                 |
|-----------------|------------------------|-------------------|-----------------|
| CHANNEL         | CH 39 + CH 48 + CH 100 | DETECTOR FUNCTION | Quasi-Peak (QP) |
| FREQUENCY RANGE | 9kHz ~ 1GHz            |                   |                 |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|-----------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.                                                 | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1                                                   | 38.73       | 24.3 QP                 | 40.0           | -15.7       | 1.25 H             | 55                   | 35.0             | -10.7                    |
| 2                                                   | 83.35       | 25.3 QP                 | 40.0           | -14.7       | 1.00 H             | 104                  | 39.8             | -14.5                    |
| 3                                                   | 145.43      | 23.6 QP                 | 43.5           | -19.9       | 1.50 H             | 178                  | 33.1             | -9.5                     |
| 4                                                   | 414.12      | 13.8 QP                 | 46.0           | -32.2       | 1.50 H             | 83                   | 19.3             | -5.5                     |
| 5                                                   | 757.50      | 26.0 QP                 | 46.0           | -20.0       | 1.00 H             | 216                  | 24.9             | 1.1                      |
| 6                                                   | 947.62      | 31.7 QP                 | 46.0           | -14.3       | 1.50 H             | 184                  | 27.3             | 4.4                      |

## 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. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.

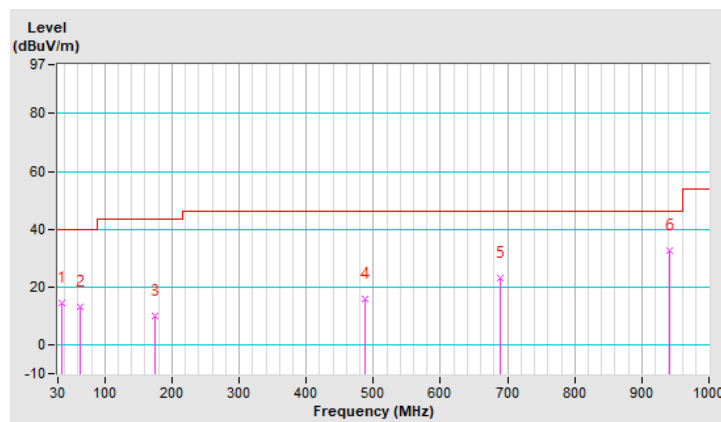


|                 |                        |                   |                 |
|-----------------|------------------------|-------------------|-----------------|
| CHANNEL         | CH 39 + CH 48 + CH 100 | DETECTOR FUNCTION | Quasi-Peak (QP) |
| FREQUENCY RANGE | 9kHz ~ 1GHz            |                   |                 |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|---------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.                                               | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1                                                 | 35.82       | 14.6 QP                 | 40.0           | -25.4       | 1.25 V             | 245                  | 25.7             | -11.1                    |
| 2                                                 | 63.95       | 13.1 QP                 | 40.0           | -26.9       | 1.25 V             | 243                  | 23.6             | -10.5                    |
| 3                                                 | 174.53      | 9.8 QP                  | 43.5           | -33.7       | 1.00 V             | 339                  | 19.7             | -9.9                     |
| 4                                                 | 487.84      | 15.8 QP                 | 46.0           | -30.2       | 1.50 V             | 12                   | 19.8             | -4.0                     |
| 5                                                 | 689.60      | 23.0 QP                 | 46.0           | -23.0       | 1.00 V             | 68                   | 23.7             | -0.7                     |
| 6                                                 | 941.80      | 32.6 QP                 | 46.0           | -13.4       | 1.25 V             | 301                  | 28.3             | 4.3                      |

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. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.



## 5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

## Appendix – 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 and approved according to ISO/IEC 17025.

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

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