

## Partial FCC Test Report

**Report No.:** RF190807C14-3

**FCC ID:** I4L-BM25SD

**Test Model:** MS-5776-A-H

**Received Date:** Aug. 07, 2019

**Test Date:** Sep. 04 ~ Sep. 05, 2019

**Issued Date:** Sep. 12, 2019

**Applicant:** Micro Star International Co., Ltd.

**Address:** No. 69, Li-De Street, Jung He City, Taipei Hsien, R.O.C. TAIWAN

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

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33383, Taiwan

**Test Location (2):** B2F., No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231,  
Taiwan

**FCC Registration /** 788550 / TW0003

**Designation Number:** 427177 / TW0011



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### Release Control Record

| Issue No.     | Description      | Date Issued   |
|---------------|------------------|---------------|
| RF190807C14-3 | Original Release | Sep. 12, 2019 |

## 1 Certificate of Conformity

**Product:** Edge Computing Gateway

**Brand:** Conexio

**Test Model:** MS-5776-A-H

**Sample Status:** Mass Product

**Applicant:** Micro Star International Co., Ltd.

**Test Date:** Sep. 04 ~ Sep. 05, 2019

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
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 : Lena Wang , Date: Sep. 12, 2019  
Lena Wang / Specialist

Approved by : Dylan Chiou , Date: Sep. 12, 2019  
Dylan Chiou / Project Engineer

## 2 Summary of Test Results

| 47 CFR FCC Part 15, Subpart C (Section 15.247) |                                                                                                               |        |                                                                                 |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------|--------|---------------------------------------------------------------------------------|
| FCC Clause                                     | Test Item                                                                                                     | Result | Remarks                                                                         |
| 15.207                                         | AC Power Conducted Emission                                                                                   | N/A    | Without AC power of the EUT                                                     |
| 15.247(a)(1)(iii)                              | Number of Hopping Frequency Used                                                                              | N/A    | Refer to Note                                                                   |
| 15.247(a)(1)(iii)                              | Dwell Time on Each Channel                                                                                    | N/A    | Refer to Note                                                                   |
| 15.247(a)(1)                                   | 1. Hopping Channel Separation<br>2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System | N/A    | Refer to Note                                                                   |
| 15.247(a)(1)                                   | Maximum Peak Output Power                                                                                     | N/A    | Refer to Note                                                                   |
| ---                                            | Occupied Bandwidth Measurement                                                                                | N/A    | Refer to Note                                                                   |
| 15.205 & 209                                   | Radiated Emissions                                                                                            | Pass   | Meet the requirement of limit. Minimum passing margin is -11.31 dB at 4960 MHz. |
| 15.247(d)                                      | Band Edge Measurement                                                                                         | N/A    | Refer to Note                                                                   |
| 15.247(d)                                      | Antenna Port Emission                                                                                         | N/A    | Refer to Note                                                                   |
| 15.203                                         | Antenna Requirement                                                                                           | N/A    | Refer to Note                                                                   |

### Note:

1. This report is a partial report. Therefore, only test item of Radiated Spurious Emissions tests were performed for this report. Other testing data please refer to BV CPS report no.: RF180518C15-1 for module (Brand: MSI, Model: BM25)
2. If the Frequency Hopping System operating in 2400-2483.5 MHz band and the output power less than 125 mW. The hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of hopping channel whichever is greater.
3. 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) (±) |
|------------------------------------|--------------------|--------------------------------|
| Conducted Emissions at mains ports | 150 kHz ~ 30 MHz   | 2.44 dB                        |
| Radiated Emissions up to 1 GHz     | 9 kHz ~ 30 MHz     | 3.04 dB                        |
|                                    | 30 MHz ~ 200 MHz   | 2.0153 dB                      |
|                                    | 200 MHz ~ 1000 MHz | 2.0224 dB                      |
| Radiated Emissions above 1 GHz     | 1 GHz ~ 18 GHz     | 1.0121 dB                      |
|                                    | 18 GHz ~ 40 GHz    | 1.1508 dB                      |

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

|                            |                                   |
|----------------------------|-----------------------------------|
| <b>Product</b>             | Edge Computing Gateway            |
| <b>Brand</b>               | Conexio                           |
| <b>Test Model</b>          | MS-5776-A-H                       |
| <b>Status of EUT</b>       | Mass Product                      |
| <b>Power Supply Rating</b> | 12.0 Vdc (DC Power Supply)        |
| <b>Modulation Type</b>     | GFSK, $\pi/4$ -DQPSK, 8DPSK       |
| <b>Transfer Rate</b>       | 1/2/3 Mbps                        |
| <b>Operating Frequency</b> | 2402 ~ 2480 MHz                   |
| <b>Number of Channel</b>   | 79                                |
| <b>Antenna Type</b>        | Couple antenna with 0.78 dBi gain |
| <b>Antenna Connector</b>   | SMA                               |
| <b>Accessory Device</b>    | Refer to Note as below            |
| <b>Data Cable Supplied</b> | N/A                               |

Note:

1. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or User's Manual.

### 3.2 Description of Test Modes

79 channels are provided to this EUT:

| Channel | Freq. (MHz) | Channel | Freq. (MHz) | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---------|-------------|---------|-------------|---------|-------------|---------|-------------|
| 0       | 2402        | 20      | 2422        | 40      | 2442        | 60      | 2462        |
| 1       | 2403        | 21      | 2423        | 41      | 2443        | 61      | 2463        |
| 2       | 2404        | 22      | 2424        | 42      | 2444        | 62      | 2464        |
| 3       | 2405        | 23      | 2425        | 43      | 2445        | 63      | 2465        |
| 4       | 2406        | 24      | 2426        | 44      | 2446        | 64      | 2466        |
| 5       | 2407        | 25      | 2427        | 45      | 2447        | 65      | 2467        |
| 6       | 2408        | 26      | 2428        | 46      | 2448        | 66      | 2468        |
| 7       | 2409        | 27      | 2429        | 47      | 2449        | 67      | 2469        |
| 8       | 2410        | 28      | 2430        | 48      | 2450        | 68      | 2470        |
| 9       | 2411        | 29      | 2431        | 49      | 2451        | 69      | 2471        |
| 10      | 2412        | 30      | 2432        | 50      | 2452        | 70      | 2472        |
| 11      | 2413        | 31      | 2433        | 51      | 2453        | 71      | 2473        |
| 12      | 2414        | 32      | 2434        | 52      | 2454        | 72      | 2474        |
| 13      | 2415        | 33      | 2435        | 53      | 2455        | 73      | 2475        |
| 14      | 2416        | 34      | 2436        | 54      | 2456        | 74      | 2476        |
| 15      | 2417        | 35      | 2437        | 55      | 2457        | 75      | 2477        |
| 16      | 2418        | 36      | 2438        | 56      | 2458        | 76      | 2478        |
| 17      | 2419        | 37      | 2439        | 57      | 2459        | 77      | 2479        |
| 18      | 2420        | 38      | 2440        | 58      | 2460        | 78      | 2480        |
| 19      | 2421        | 39      | 2441        | 59      | 2461        |         |             |

### 3.2.1 Test Mode Applicability and Tested Channel Detail

| EUT Configure Mode | Applicable To |       | Description |
|--------------------|---------------|-------|-------------|
|                    | RE $\geq$ 1G  | RE<1G |             |
| -                  | √             | √     | -           |

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

Note: "- " means no effect.

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

- ☒ 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 | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Packet Type |
|--------------------|-------------------|----------------|-----------------------|-----------------|-------------|
| -                  | 0 to 78           | 0, 39, 78      | FHSS                  | GFSK            | DH5         |
|                    | 0 to 78           | 0, 39, 78      | FHSS                  | 8DPSK           | 3DH5        |

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

- ☒ 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 | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Packet Type |
|--------------------|-------------------|----------------|-----------------------|-----------------|-------------|
| -                  | 0 to 78           | 78             | FHSS                  | 8DPSK           | 3DH5        |

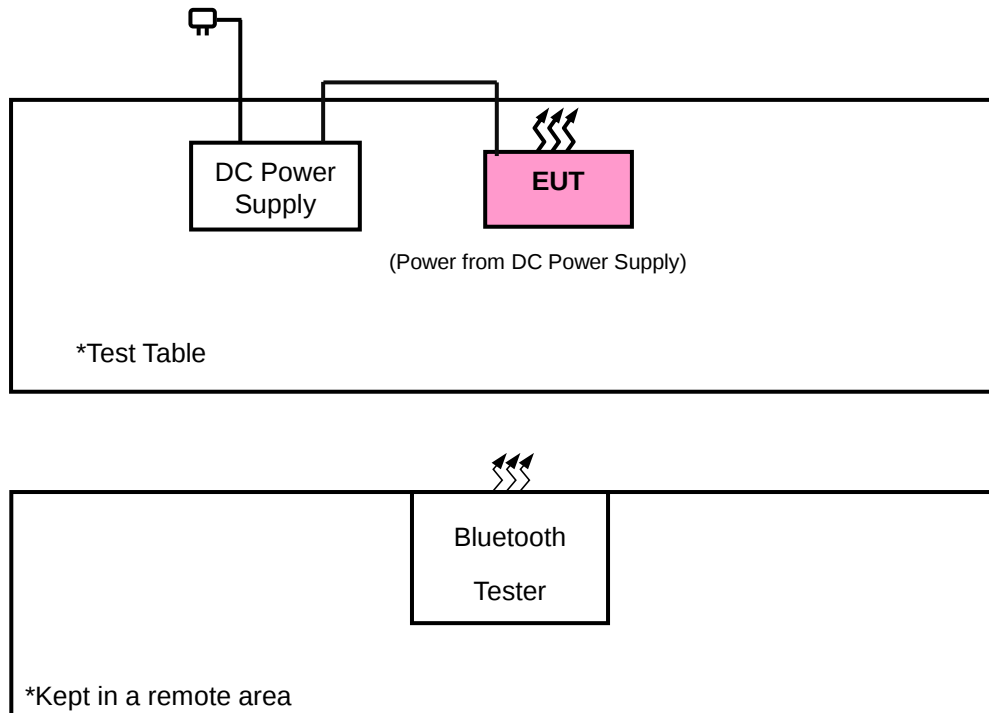
#### Test Condition:

| Applicable To | Environmental Conditions | Input Power    | Tested by |
|---------------|--------------------------|----------------|-----------|
| RE $\geq$ 1G  | 25 deg. C, 65 % RH       | 120 Vac, 60 Hz | Karl Lee  |
| RE<1G         | 25 deg. C, 65 % RH       | 120 Vac, 60 Hz | Karl Lee  |

### 3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

#### 3.3.1 Configuration of System under Test



### 3.4 General Description of Applied Standards

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

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

**KDB 558074 D01 15.247 Meas Guidance v05r02**

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. 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                             |

**Note:**

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

#### 4.1.2 Test Instruments

| Description & Manufacturer                     | Model No.       | Serial No.                                            | Date of Calibration | Due Date of Calibration |
|------------------------------------------------|-----------------|-------------------------------------------------------|---------------------|-------------------------|
| Test Receiver<br>Agilent Technologies          | N9038A          | MY52260177                                            | Aug. 26, 2019       | Aug. 25, 2020           |
| Spectrum Analyzer<br>ROHDE & SCHWARZ           | FSW26           | 102023                                                | Oct. 11, 2018       | Oct. 10, 2019           |
| HORN Antenna<br>ETS-Lindgren                   | 3117            | 00143293                                              | Nov. 25, 2018       | Nov. 24, 2019           |
| BILOG Antenna<br>SCHWARZBECK                   | VULB 9168       | 9168-616                                              | Nov. 27, 2018       | Nov. 26, 2019           |
| HORN Antenna<br>SCHWARZBECK                    | BBHA 9170       | 9170-480                                              | Nov. 25, 2018       | Nov. 24, 2019           |
| Fixed Attenuator<br>Mini-Circuits              | MDCS18N-10      | MDCS18N-10-01                                         | Apr. 15, 2019       | Apr. 14, 2020           |
| Bluetooth Tester                               | CBT             | 100980                                                | Jul. 14, 2019       | Jul. 13, 2020           |
| Loop Antenna                                   | EM-6879         | 269                                                   | Sep. 07, 2018       | Sep. 06, 2019           |
| Preamplifier<br>Agilent                        | 310N            | 187226                                                | Jun. 18, 2019       | Jun. 17, 2020           |
| Preamplifier<br>Agilent                        | 83017A          | MY39501357                                            | Jun. 18, 2019       | Jun. 17, 2020           |
| RF signal cable<br>ETS-LINDGREN                | 5D-FB           | Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400) | Jun. 18, 2019       | Jun. 17, 2020           |
| RF signal cable<br>ETS-LINDGREN                | 8D-FB           | Cable-CH1-02(RFC-SMS-100-SMS-24)                      | Jun. 18, 2019       | Jun. 17, 2020           |
| Boresight Antenna Fixture                      | FBA-01          | FBA-SIP01                                             | NA                  | NA                      |
| Software<br>BV ADT                             | E3<br>8.130425b | NA                                                    | NA                  | NA                      |
| Antenna Tower<br>MF                            | NA              | NA                                                    | NA                  | NA                      |
| Turn Table<br>MF                               | NA              | NA                                                    | NA                  | NA                      |
| Antenna Tower & Turn<br>Table Controller<br>MF | MF-7802         | NA                                                    | NA                  | NA                      |
| DC Power Supply<br>Topward                     | 33010D          | 807748                                                | NA                  | NA                      |

- 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 HsinTien Chamber 1.

#### 4.1.3 Test Procedures

##### **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 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. Both 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 9 kHz at frequency below 30 MHz.

##### **For Radiated Emission above 30 MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) 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 detected 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:**

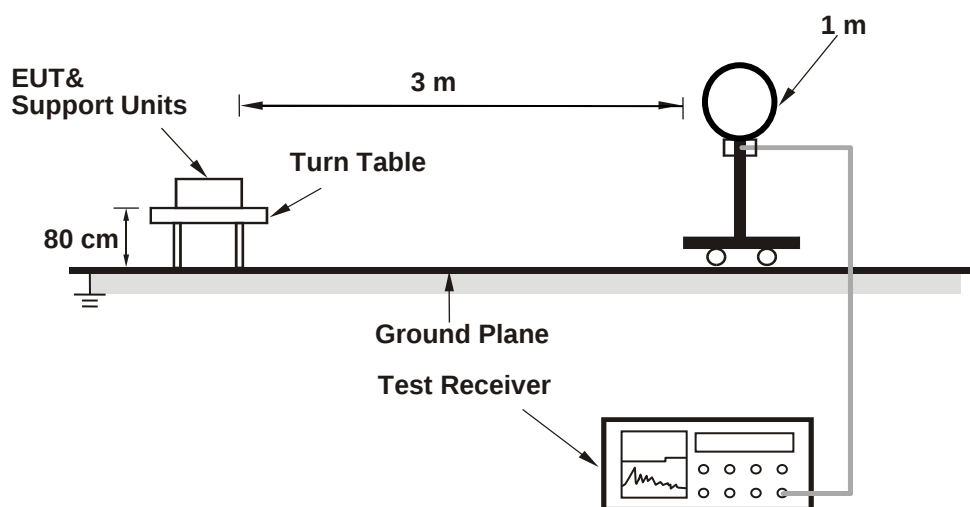
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. 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. (RBW = 1 MHz, VBW = 10 Hz)
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

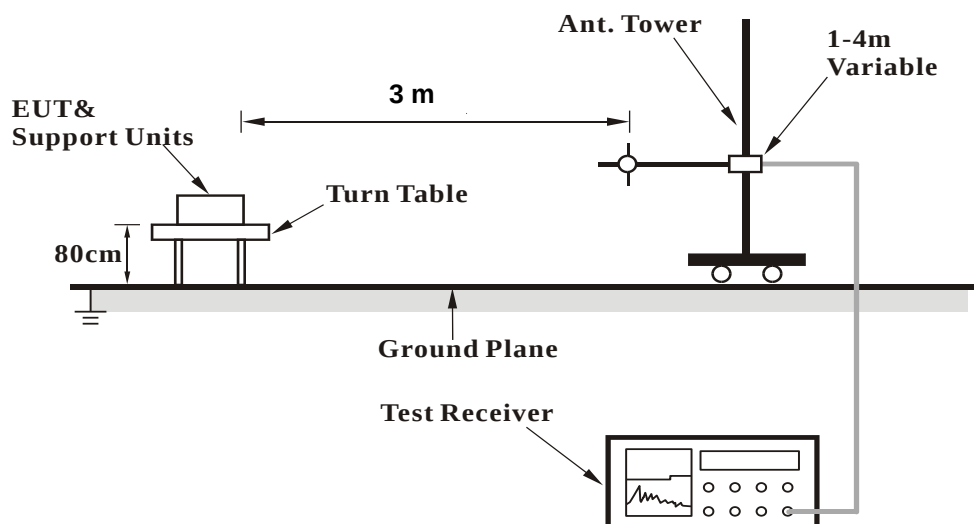
No deviation.

#### 4.1.5 Test Set Up

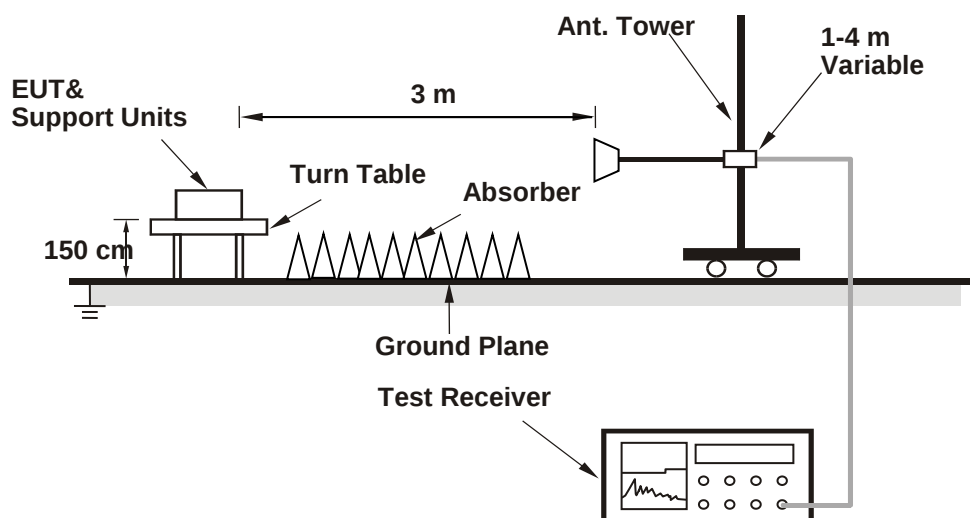
##### <Radiated Emission below 30 MHz>



##### <Radiated Emission 30 MHz to 1 GHz>



### <Radiated Emission above 1 GHz>



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

#### 4.1.6 EUT Operating Conditions

Set the EUT under transmission condition continuously at specific channel frequency.

#### 4.1.7 Test Results

##### Above 1 GHz Data: GFSK

| EUT Test Condition       |                    | Measurement Detail |                           |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel                  | Channel 0          | Frequency Range    | 1 GHz ~ 25 GHz            |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Karl Lee                  |

| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |               |                |             |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|---------------|----------------|-------------|---------------------|----------------------|---------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2386.34                                             | 41.41                   | 36.92             | 4.49          | 54             | -12.59      | 290                 | 21                   | Average |
| 2386.34                                             | 51.52                   | 47.03             | 4.49          | 74             | -22.48      | 290                 | 21                   | Peak    |
| 2402                                                | 98.23                   | 93.71             | 4.52          |                |             | 290                 | 21                   | Average |
| 2402                                                | 100.68                  | 96.16             | 4.52          |                |             | 290                 | 21                   | Peak    |
| 4804                                                | 42.27                   | 31.92             | 10.35         | 54             | -11.73      | 128                 | 134                  | Average |
| 4804                                                | 48.32                   | 37.97             | 10.35         | 74             | -25.68      | 128                 | 134                  | Peak    |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |               |                |             |                     |                      |         |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2385.21                                             | 41.35                   | 36.88             | 4.47          | 54             | -12.65      | 190                 | 335                  | Average |
| 2385.21                                             | 52.21                   | 47.74             | 4.47          | 74             | -21.79      | 190                 | 335                  | Peak    |
| 2402                                                | 94.82                   | 90.3              | 4.52          |                |             | 190                 | 335                  | Average |
| 2402                                                | 97.45                   | 92.93             | 4.52          |                |             | 190                 | 335                  | Peak    |
| 4804                                                | 42.1                    | 31.75             | 10.35         | 54             | -11.9       | 124                 | 115                  | Average |
| 4804                                                | 48.48                   | 38.13             | 10.35         | 74             | -25.52      | 124                 | 115                  | Peak    |

##### Remarks:

- Emission Level = Read Level + Factor  
Margin value = Emission level – Limit value
- 2402 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

| EUT Test Condition       |                    | Measurement Detail |                           |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel                  | Channel 39         | Frequency Range    | 1 GHz ~ 25 GHz            |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Karl Lee                  |

| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |               |                |             |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|---------------|----------------|-------------|---------------------|----------------------|---------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2370.39                                             | 41.14                   | 36.69             | 4.45          | 54             | -12.86      | 290                 | 21                   | Average |
| 2370.39                                             | 51.82                   | 47.37             | 4.45          | 74             | -22.18      | 290                 | 21                   | Peak    |
| 2441                                                | 97.61                   | 93.03             | 4.58          |                |             | 290                 | 21                   | Average |
| 2441                                                | 100.33                  | 95.75             | 4.58          |                |             | 290                 | 21                   | Peak    |
| 2487.4                                              | 41.17                   | 36.51             | 4.66          | 54             | -12.83      | 290                 | 21                   | Average |
| 2487.4                                              | 51.69                   | 47.03             | 4.66          | 74             | -22.31      | 290                 | 21                   | Peak    |
| 4882                                                | 42.58                   | 32.37             | 10.21         | 54             | -11.42      | 193                 | 287                  | Average |
| 4882                                                | 48.94                   | 38.73             | 10.21         | 74             | -25.06      | 193                 | 287                  | Peak    |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |               |                |             |                     |                      |         |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2380.84                                             | 40.26                   | 35.79             | 4.47          | 54             | -13.74      | 190                 | 335                  | Average |
| 2380.84                                             | 51.39                   | 46.92             | 4.47          | 74             | -22.61      | 190                 | 335                  | Peak    |
| 2441                                                | 92.94                   | 88.36             | 4.58          |                |             | 190                 | 335                  | Average |
| 2441                                                | 95.22                   | 90.64             | 4.58          |                |             | 190                 | 335                  | Peak    |
| 2492.16                                             | 41.17                   | 36.5              | 4.67          | 54             | -12.83      | 190                 | 335                  | Average |
| 2492.16                                             | 51.38                   | 46.71             | 4.67          | 74             | -22.62      | 190                 | 335                  | Peak    |
| 4882                                                | 42.38                   | 32.17             | 10.21         | 54             | -11.62      | 182                 | 113                  | Average |
| 4882                                                | 48.27                   | 38.06             | 10.21         | 74             | -25.73      | 182                 | 113                  | Peak    |

Remarks:

1. Emission Level = Read Level + Factor  
Margin value = Emission level – Limit value
2. 2441 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

| EUT Test Condition       |                    | Measurement Detail |                           |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel                  | Channel 78         | Frequency Range    | 1 GHz ~ 25 GHz            |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Karl Lee                  |

| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |               |                |             |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|---------------|----------------|-------------|---------------------|----------------------|---------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2480                                                | 98.46                   | 93.82             | 4.64          |                |             | 290                 | 31                   | Average |
| 2480                                                | 100.61                  | 95.97             | 4.64          |                |             | 290                 | 31                   | Peak    |
| 2489.67                                             | 41.17                   | 36.49             | 4.68          | 54             | -12.83      | 290                 | 31                   | Average |
| 2489.67                                             | 52.36                   | 47.68             | 4.68          | 74             | -21.64      | 290                 | 31                   | Peak    |
| 4960                                                | 42.58                   | 32.22             | 10.36         | 54             | -11.42      | 106                 | 127                  | Average |
| 4960                                                | 48.47                   | 38.11             | 10.36         | 74             | -25.53      | 106                 | 127                  | Peak    |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |               |                |             |                     |                      |         |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2480                                                | 93.03                   | 88.39             | 4.64          |                |             | 190                 | 335                  | Average |
| 2480                                                | 95.62                   | 90.98             | 4.64          |                |             | 190                 | 335                  | Peak    |
| 2485.06                                             | 41.36                   | 36.7              | 4.66          | 54             | -12.64      | 190                 | 335                  | Average |
| 2485.06                                             | 51.72                   | 47.06             | 4.66          | 74             | -22.28      | 190                 | 335                  | Peak    |
| 4960                                                | 42.65                   | 32.29             | 10.36         | 54             | -11.35      | 164                 | 107                  | Average |
| 4960                                                | 49.03                   | 38.67             | 10.36         | 74             | -24.97      | 164                 | 107                  | Peak    |

Remarks:

- Emission Level = Read Level + Factor  
Margin value = Emission level – Limit value
- 2480 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

# 8DPSK

| EUT Test Condition       |                    | Measurement Detail |                           |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel                  | Channel 0          | Frequency Range    | 1 GHz ~ 25 GHz            |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Karl Lee                  |

| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |               |                |             |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|---------------|----------------|-------------|---------------------|----------------------|---------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2387.04                                             | 41.24                   | 36.75             | 4.49          | 54             | -12.76      | 290                 | 21                   | Average |
| 2387.04                                             | 51.64                   | 47.15             | 4.49          | 74             | -22.36      | 290                 | 21                   | Peak    |
| 2402                                                | 97.11                   | 92.59             | 4.52          |                |             | 290                 | 21                   | Average |
| 2402                                                | 99.64                   | 95.12             | 4.52          |                |             | 290                 | 21                   | Peak    |
| 4804                                                | 42.18                   | 31.83             | 10.35         | 54             | -11.82      | 128                 | 134                  | Average |
| 4804                                                | 48.53                   | 38.18             | 10.35         | 74             | -25.47      | 128                 | 134                  | Peak    |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |               |                |             |                     |                      |         |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2389.43                                             | 41.17                   | 36.68             | 4.49          | 54             | -12.83      | 190                 | 335                  | Average |
| 2389.43                                             | 51.41                   | 46.92             | 4.49          | 74             | -22.59      | 190                 | 335                  | Peak    |
| 2402                                                | 93.59                   | 89.07             | 4.52          |                |             | 190                 | 335                  | Average |
| 2402                                                | 96.27                   | 91.75             | 4.52          |                |             | 190                 | 335                  | Peak    |
| 4804                                                | 42.6                    | 32.25             | 10.35         | 54             | -11.4       | 124                 | 115                  | Average |
| 4804                                                | 48.71                   | 38.36             | 10.35         | 74             | -25.29      | 124                 | 115                  | Peak    |

## Remarks:

- Emission Level = Read Level + Factor  
Margin value = Emission level – Limit value
- 2402 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

| EUT Test Condition       |                    | Measurement Detail |                           |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel                  | Channel 39         | Frequency Range    | 1 GHz ~ 25 GHz            |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Karl Lee                  |

| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |               |                |             |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|---------------|----------------|-------------|---------------------|----------------------|---------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2368.43                                             | 41.29                   | 36.86             | 4.43          | 54             | -12.71      | 290                 | 21                   | Average |
| 2368.43                                             | 52.04                   | 47.61             | 4.43          | 74             | -21.96      | 290                 | 21                   | Peak    |
| 2441                                                | 96.48                   | 91.9              | 4.58          |                |             | 290                 | 21                   | Average |
| 2441                                                | 99.16                   | 94.58             | 4.58          |                |             | 290                 | 21                   | Peak    |
| 2492.37                                             | 41.36                   | 36.69             | 4.67          | 54             | -12.64      | 290                 | 21                   | Average |
| 2492.37                                             | 51.37                   | 46.7              | 4.67          | 74             | -22.63      | 290                 | 21                   | Peak    |
| 4882                                                | 42.39                   | 32.18             | 10.21         | 54             | -11.61      | 193                 | 287                  | Average |
| 4882                                                | 48.71                   | 38.5              | 10.21         | 74             | -25.29      | 193                 | 287                  | Peak    |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |               |                |             |                     |                      |         |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2372.28                                             | 41.55                   | 37.1              | 4.45          | 54             | -12.45      | 190                 | 335                  | Average |
| 2372.28                                             | 51.67                   | 47.22             | 4.45          | 74             | -22.33      | 190                 | 335                  | Peak    |
| 2441                                                | 91.86                   | 87.28             | 4.58          |                |             | 190                 | 335                  | Average |
| 2441                                                | 94.37                   | 89.79             | 4.58          |                |             | 190                 | 335                  | Peak    |
| 2485.29                                             | 41.36                   | 36.7              | 4.66          | 54             | -12.64      | 190                 | 335                  | Average |
| 2485.29                                             | 51.63                   | 46.97             | 4.66          | 74             | -22.37      | 190                 | 335                  | Peak    |
| 4882                                                | 42.35                   | 32.14             | 10.21         | 54             | -11.65      | 182                 | 113                  | Average |
| 4882                                                | 48.69                   | 38.48             | 10.21         | 74             | -25.31      | 182                 | 113                  | Peak    |

Remarks:

1. Emission Level = Read Level + Factor  
Margin value = Emission level – Limit value
2. 2441 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

| EUT Test Condition       |                    | Measurement Detail |                           |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel                  | Channel 78         | Frequency Range    | 1 GHz ~ 25 GHz            |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Karl Lee                  |

| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |               |                |             |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|---------------|----------------|-------------|---------------------|----------------------|---------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2480                                                | 97.13                   | 92.49             | 4.64          |                |             | 290                 | 31                   | Average |
| 2480                                                | 99.56                   | 94.92             | 4.64          |                |             | 290                 | 31                   | Peak    |
| 2487.35                                             | 41.56                   | 36.9              | 4.66          | 54             | -12.44      | 290                 | 31                   | Average |
| 2487.35                                             | 52.11                   | 47.45             | 4.66          | 74             | -21.89      | 290                 | 31                   | Peak    |
| 4960                                                | 42.69                   | 32.33             | 10.36         | 54             | -11.31      | 106                 | 127                  | Average |
| 4960                                                | 48.71                   | 38.35             | 10.36         | 74             | -25.29      | 106                 | 127                  | Peak    |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |               |                |             |                     |                      |         |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2480                                                | 91.76                   | 87.12             | 4.64          |                |             | 190                 | 335                  | Average |
| 2480                                                | 94.54                   | 89.9              | 4.64          |                |             | 190                 | 335                  | Peak    |
| 2484.27                                             | 41.53                   | 36.87             | 4.66          | 54             | -12.47      | 190                 | 335                  | Average |
| 2484.27                                             | 52.22                   | 47.56             | 4.66          | 74             | -21.78      | 190                 | 335                  | Peak    |
| 4960                                                | 42.36                   | 32                | 10.36         | 54             | -11.64      | 164                 | 107                  | Average |
| 4960                                                | 48.75                   | 38.39             | 10.36         | 74             | -25.25      | 164                 | 107                  | Peak    |

Remarks:

- Emission Level = Read Level + Factor  
Margin value = Emission level – Limit value
- 2480 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.

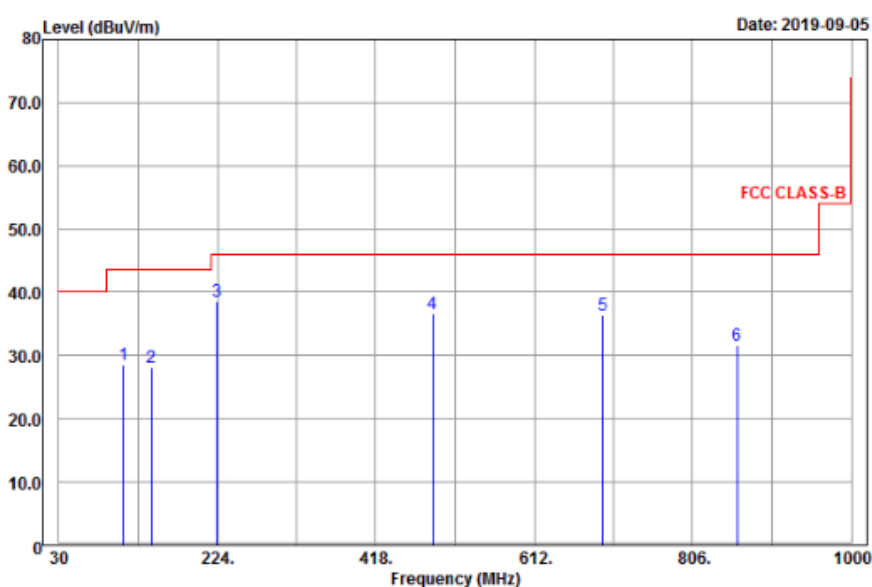
### 9 kHz ~ 30 MHz Data:

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

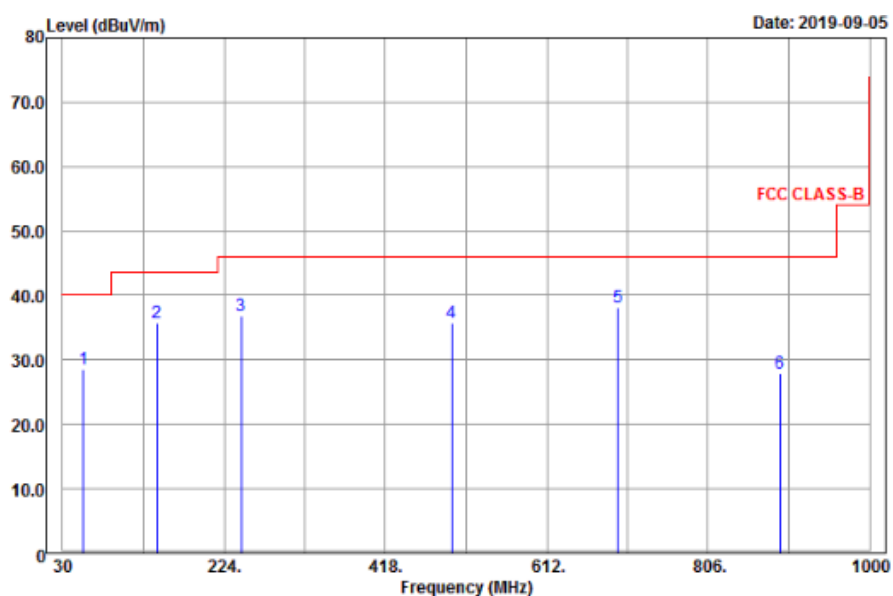
### 30 MHz ~ 1 GHz Worst-Case Data:

| EUT Test Condition       |                    | Measurement Detail |                              |
|--------------------------|--------------------|--------------------|------------------------------|
| Channel                  | Channel 78         | Frequency Range    | 30 MHz ~ 1 GHz               |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Quasi-peak (QP) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Karl Lee                     |

### Horizontal



### Vertical



| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |               |                |             |                     |                      |        |
|-----------------------------------------------------|-------------------------|-------------------|---------------|----------------|-------------|---------------------|----------------------|--------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 108.84                                              | 28.56                   | 46.02             | -17.46        | 43.5           | -14.94      | 162                 | 105                  | Peak   |
| 143.67                                              | 28.22                   | 49.25             | -21.03        | 43.5           | -15.28      | 173                 | 306                  | Peak   |
| 223.59                                              | 38.62                   | 56.28             | -17.66        | 46             | -7.38       | 134                 | 118                  | Peak   |
| 487.6                                               | 36.62                   | 49.19             | -12.57        | 46             | -9.38       | 167                 | 135                  | Peak   |
| 696.2                                               | 36.47                   | 45.73             | -9.26         | 46             | -9.53       | 125                 | 184                  | Peak   |
| 860.7                                               | 31.6                    | 38.16             | -6.56         | 46             | -14.4       | 105                 | 199                  | Peak   |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |               |                |             |                     |                      |        |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 54.84                                               | 28.49                   | 43.98             | -15.49        | 40             | -11.51      | 109                 | 233                  | Peak   |
| 143.67                                              | 35.77                   | 56.8              | -21.03        | 43.5           | -7.73       | 164                 | 125                  | Peak   |
| 244.92                                              | 36.74                   | 53.67             | -16.93        | 46             | -9.26       | 134                 | 178                  | Peak   |
| 498.1                                               | 35.76                   | 48.09             | -12.33        | 46             | -10.24      | 178                 | 161                  | Peak   |
| 697.6                                               | 38.18                   | 47.43             | -9.25         | 46             | -7.82       | 150                 | 28                   | Peak   |
| 892.2                                               | 27.96                   | 33.99             | -6.03         | 46             | -18.04      | 139                 | 357                  | Peak   |

Remarks:

- Emission Level = Read Level + Factor  
Margin value = Emission level – Limit value
- The emission levels of other frequencies were very low against the limit.

## 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 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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