

## Partial FCC Test Report

**Report No.:** RF160526C29-1

**FCC ID:** PPD-AR5B22

**Test Model:** AR5B22

**Received Date:** May 26, 2016

**Test Date:** Jun. 02, 2016 ~ Jun. 16, 2016

**Issued Date:** Jun. 24, 2016

**Applicant:** Qualcomm Atheros, Inc.

**Address:** 1700 Technology Drive, San Jose, CA95110

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

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan  
( R.O.C )

**Test Location (1):** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan  
Hsien 333, Taiwan, R.O.C.

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



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### Release Control Record

| Issue No.     | Description      | Date Issued   |
|---------------|------------------|---------------|
| RF160526C29-1 | Original Release | Jun. 24, 2016 |

## 1 Certificate of Conformity

**Product:** PCIE 802.11a/b/g/n 2.4GHz/5GHz+USB BT 4.0 card

**Brand:** Atheros

**Test Model:** AR5B22

**Sample Status:** Identical Prototype

**Applicant:** Qualcomm Atheros, Inc.

**Test Date:** Jun. 02, 2016 ~ Jun. 16, 2016

**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 EMC characteristics under the conditions specified in this report.

**Prepared by :** Evonne Liu, **Date:** Jun. 24, 2016  
Evonne Liu / Specialist

**Approved by :** Stanley Wu, **Date:** Jun. 24, 2016  
Stanley Wu / Assistant Manager

## 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                                                                                   | Pass   | Meet the requirement of limit.<br>Minimum passing margin is -20.68 dB at 0.15000 MHz. |
| 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(b)                                      | Maximum Peak Output Power                                                                                     | Pass   | Meet the requirement of limit.                                                        |
| 15.205 & 209                                   | Radiated Emissions                                                                                            | Pass   | Meet the requirement of limit.<br>Minimum passing margin is -1.33 dB at 2364 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: Only test item of Conducted and Radiated Emissions, Conducted power were performed for this report. Other testing data is referring to module report (Test Report No.: RF110907E02-2 R1).

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

| Measurement                    | Frequency          | Expanded Uncertainty (k=2) (±) |
|--------------------------------|--------------------|--------------------------------|
| Radiated Emissions up to 1 GHz | 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>             | PCIE 802.11a/b/g/n 2.4GHz/5GHz+USB BT 4.0 card |
| <b>Brand</b>               | Atheros                                        |
| <b>Test Model</b>          | AR5B22                                         |
| <b>Status of EUT</b>       | Identical Prototype                            |
| <b>Power Supply Rating</b> | 19.5 Vdc (adapter)                             |
| <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>Output Power</b>        | 5.082 mW                                       |
| <b>Antenna Type</b>        | Refer to Note as below                         |
| <b>Antenna Connector</b>   | N/A                                            |
| <b>Accessory Device</b>    | N/A                                            |
| <b>Data Cable Supplied</b> | N/A                                            |

Note:

1. The antenna information is listed as below.

| Antenna Type | Brand Name                          | Parts Number                                                              | Antenna Gain (dBi)      |
|--------------|-------------------------------------|---------------------------------------------------------------------------|-------------------------|
|              |                                     |                                                                           | 2.4GHz                  |
| Dipole       | Laird                               | WLAN Main Antenna: PDV24515-DE1<br>WLAN Aux Antenna: PDV24515-DE1         | Main: 2.9<br>Aux: 2.9   |
| Monopole     | Taoglas<br>Antenna<br>Solution Ltd. | WLAN Main Antenna: MA761.B.BICG.014<br>WLAN Aux Antenna: MA761.B.BICG.014 | Main: 2.82<br>Aux: 2.79 |

Note: The EUT antenna is a specified antenna: Professional installation antenna. It complies with the standard requirement.

2. The EUT is authorized for use in specific End-product. Please refer to below table for more details.

| Item                | Brand | Model |
|---------------------|-------|-------|
| Industrial Computer | Dell  | N02PC |

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

### 3.2 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 | PLC | APCM |                  |
| A                  | √             | √     | √   | -    | Dipol Antenna    |
| B                  | √             | √     | √   | -    | Momopole Antenna |

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

**RE<1G**: Radiated Emission below 1 GHz

**PLC**: Power Line Conducted Emission

**APCM**: Antenna Port Conducted Measurement

**NOTE:**

1. For Radiated emission test, pre-tested GFSK,  $\pi/4$ -DQPSK, 8DPSK modulation type and found 8DPSK was the worse, therefore chosen for the final test and presented in the test report.
2. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.
3. "-" 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 |
|--------------------|-------------------|----------------|-----------------------|-----------------|-------------|
| A, B               | 0 to 78           | 0, 39, 78      | FHSS                  | 8DPSK           | DH5         |

#### **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 |
|--------------------|-------------------|----------------|-----------------------|-----------------|-------------|
| A, B               | 0 to 78           | 39             | FHSS                  | 8DPSK           | DH5         |

#### **Power Line Conducted Emission Test:**

- ☒ 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 |
|--------------------|-------------------|----------------|-----------------------|-----------------|-------------|
| A, B               | 0 to 78           | 39             | FHSS                  | 8DPSK           | DH5         |

#### **Test Condition:**

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



### 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.

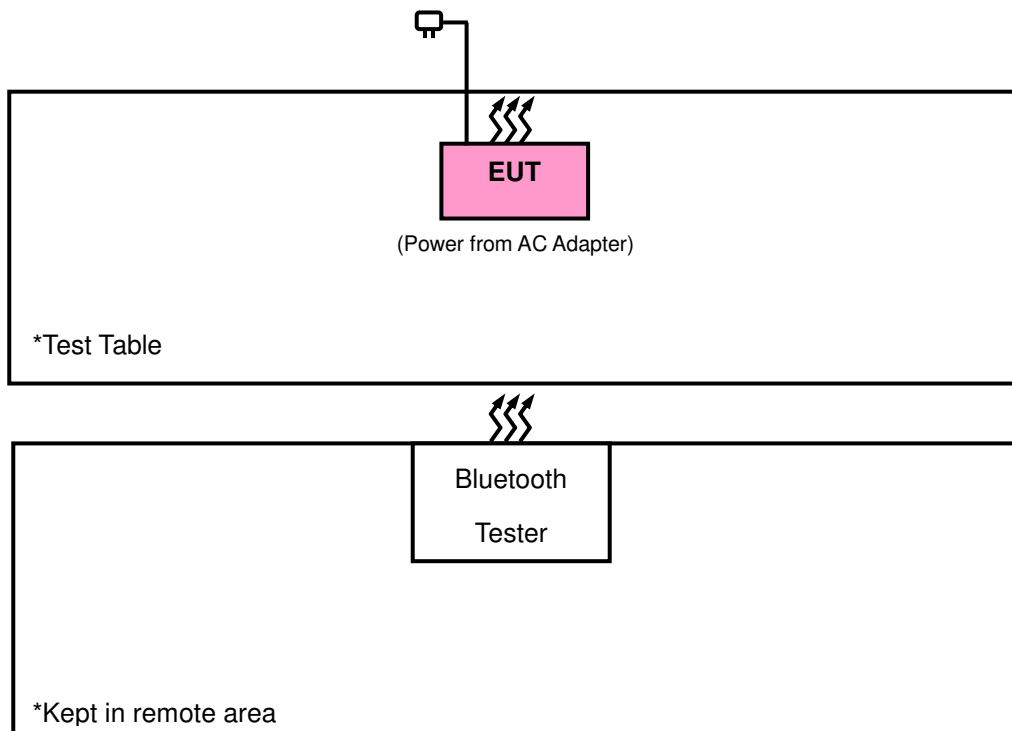
| No. | Product          | Brand | Model No. | Serial No. | FCC ID |
|-----|------------------|-------|-----------|------------|--------|
| 1.  | Bluetooth Tester | R&S   | CBT       | 100980     | N/A    |

| No. | Signal Cable Description Of The Above Support Units |
|-----|-----------------------------------------------------|
| 1.  | N/A                                                 |

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item 1 acted as communication partners to transfer data.

#### 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)**

**FCC Public Notice DA 00-705**

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:

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

#### 4.1.2 Test Instruments

| Description & Manufacturer                     | Model No.       | Serial No.                                                        | Date of Calibration | Due Date of Calibration |
|------------------------------------------------|-----------------|-------------------------------------------------------------------|---------------------|-------------------------|
| Test Receiver<br>Agilent Technologies          | N9038A          | MY50010135                                                        | Jul. 18, 2015       | Jul. 17, 2016           |
| Spectrum Analyzer<br>ROHDE & SCHWARZ           | FSU43           | 101261                                                            | Dec. 17, 2015       | Dec. 16, 2016           |
| BILOG Antenna<br>SCHWARZBECK                   | VULB9168        | 9168-472                                                          | Jan. 07, 2016       | Jan. 06, 2017           |
| HORN Antenna<br>ETS-Lindgren                   | 3117            | 00143293                                                          | Jan. 04, 2016       | Jan. 03, 2017           |
| Bluetooth Tester                               | CBT             | 100980                                                            | Apr. 27, 2015       | Apr. 26, 2017           |
| Loop Antenna                                   | EM-6879         | 269                                                               | Jul. 31, 2015       | Jul. 30, 2016           |
| Agilent Communications<br>Tester-Wireless      | 8960 Series 10  | MY53201073                                                        | Jul. 03, 2015       | Jul. 02, 2017           |
| Preamplifier<br>Agilent                        | 310N            | 187226                                                            | Jun. 29, 2015       | Jun. 28, 2016           |
| Preamplifier<br>Agilent                        | 83017A          | MY39501357                                                        | Jun. 29, 2015       | Jun. 28, 2016           |
| Power Meter<br>Anritsu                         | ML2495A         | 1232002                                                           | Sep. 21, 2015       | Sep. 20, 2016           |
| Power Sensor<br>Anritsu                        | MA2411B         | 1207325                                                           | Sep. 21, 2015       | Sep. 20, 2016           |
| RF signal cable<br>ETS-LINDGREN                | 5D-FB           | Cable-CH1-01(R<br>FC-SMS-100-SM<br>S-120+RFC-SMS<br>-100-SMS-400) | Jun. 27, 2015       | Jun. 26, 2016           |
| RF signal cable<br>ETS-LINDGREN                | 8D-FB           | Cable-CH1-02(R<br>FC-SMS-100-SM<br>S-24)                          | Jun. 27, 2015       | Jun. 26, 2016           |
| 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                      |

- 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.
3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The FCC Site Registration No. is 149147.
5. The IC Site Registration No. is IC7450I-1.

#### 4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 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:**

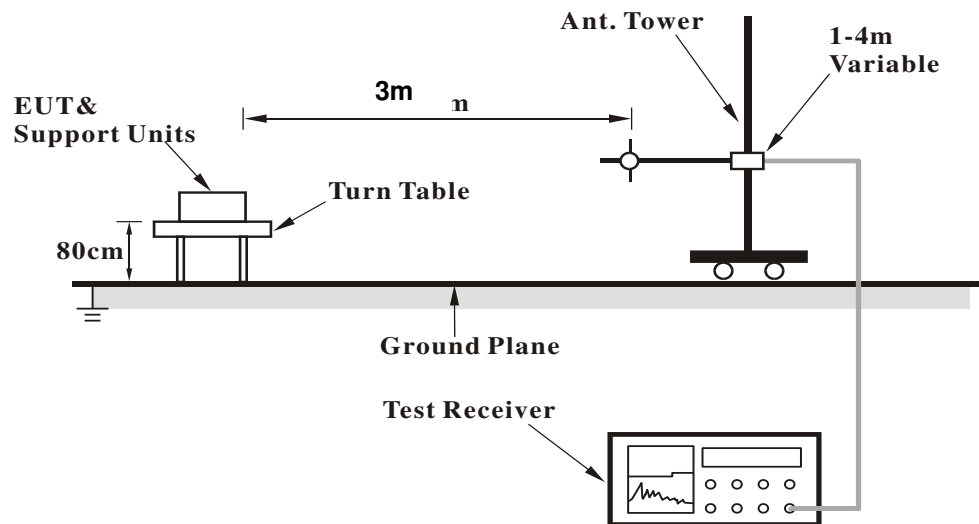
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for RMS Average (Duty cycle < 98 %) for Average detection (AV) at frequency above 1 GHz, then the measurement results was added to a correction factor ( $10 \log(1/\text{duty cycle})$ ).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz (Duty cycle  $\geq 98$  %) for Average detection (AV) at frequency above 1 GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

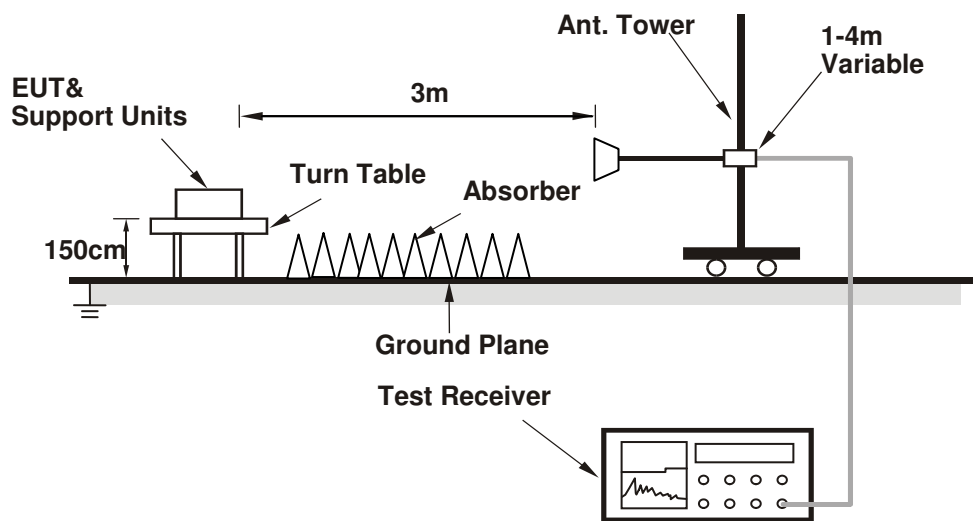
No deviation.

#### 4.1.5 Test Set Up

##### <Frequency Range below 1 GHz>



##### <Frequency Range 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

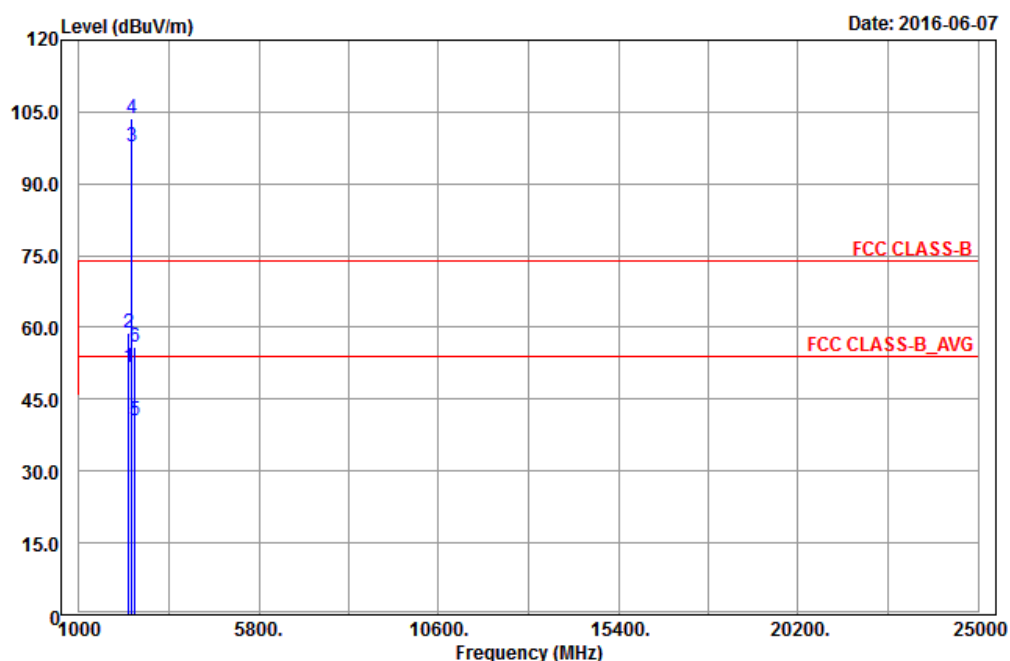
ABOVE 1 GHz DATA :

8DPSK

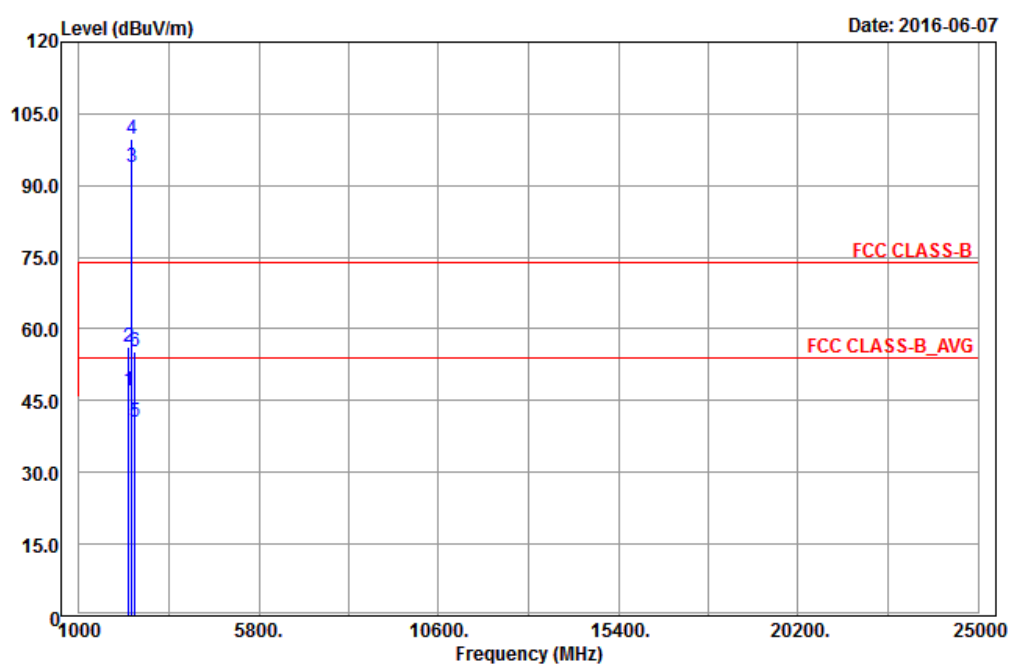
Mode A

| 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          | Charles Hsiao             |

#### Horizontal



#### Vertical



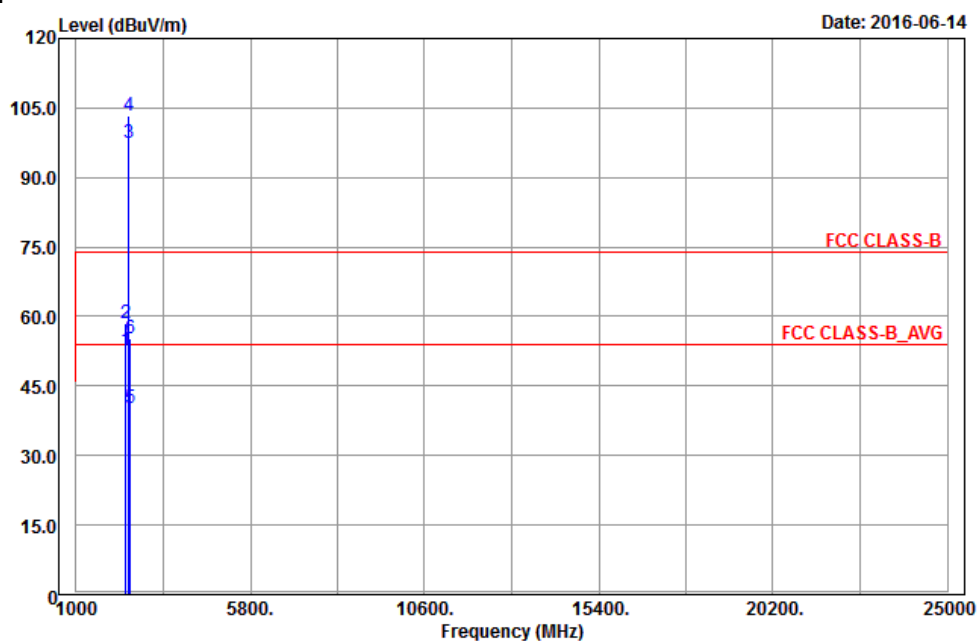
| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |                |             |                       |                 |                    |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2322                                                | 51.71                   | 50.2              | 54             | -2.29       | 31.73                 | 5.3             | 35.52              | 234                 | 109                  | Average |
| 2322                                                | 58.71                   | 57.2              | 74             | -15.29      | 31.73                 | 5.3             | 35.52              | 234                 | 109                  | Peak    |
| 2402                                                | 97.8                    | 96.07             |                |             | 31.8                  | 5.4             | 35.47              | 206                 | 109                  | Average |
| 2402                                                | 103.51                  | 101.78            |                |             | 31.8                  | 5.4             | 35.47              | 206                 | 109                  | Peak    |
| 2484                                                | 40.48                   | 38.52             | 54             | -13.52      | 31.88                 | 5.5             | 35.42              | 206                 | 109                  | Average |
| 2484                                                | 55.84                   | 53.88             | 74             | -18.16      | 31.88                 | 5.5             | 35.42              | 206                 | 109                  | Peak    |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |                |             |                       |                 |                    |                     |                      |         |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2322                                                | 47.15                   | 45.64             | 54             | -6.85       | 31.73                 | 5.3             | 35.52              | 101                 | 119                  | Average |
| 2322                                                | 56.34                   | 54.83             | 74             | -17.66      | 31.73                 | 5.3             | 35.52              | 101                 | 119                  | Peak    |
| 2402                                                | 93.89                   | 92.16             |                |             | 31.8                  | 5.4             | 35.47              | 117                 | 119                  | Average |
| 2402                                                | 99.66                   | 97.93             |                |             | 31.8                  | 5.4             | 35.47              | 117                 | 119                  | Peak    |
| 2500                                                | 40.48                   | 38.46             | 54             | -13.52      | 31.9                  | 5.53            | 35.41              | 117                 | 119                  | Average |
| 2500                                                | 55.36                   | 53.34             | 74             | -18.64      | 31.9                  | 5.53            | 35.41              | 117                 | 119                  | Peak    |

Remarks:

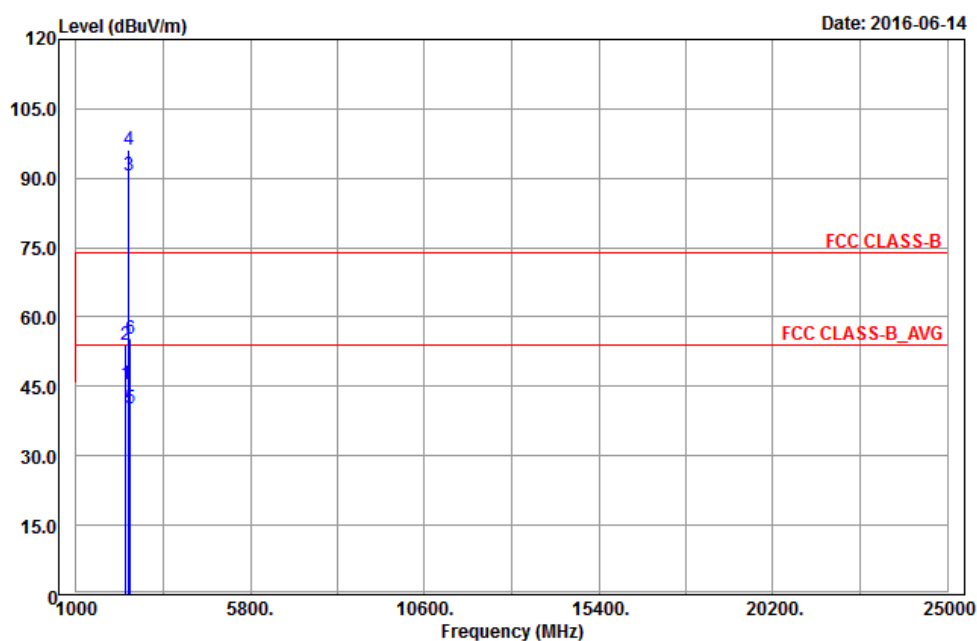
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin Value = Emission Level – Limit value
2. 2402 MHz: Fundamental Frequency

| 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          | Charles Hsiao             |

### Horizontal



### Vertical





| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |                |             |                       |                 |                    |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2364                                                | 52.67                   | 51.04             | 54             | -1.33       | 31.76                 | 5.37            | 35.5               | 291                 | 124                  | Average |
| 2364                                                | 58.47                   | 56.84             | 74             | -15.53      | 31.76                 | 5.37            | 35.5               | 291                 | 124                  | Peak    |
| 2441                                                | 97.36                   | 95.49             |                |             | 31.85                 | 5.46            | 35.44              | 223                 | 125                  | Average |
| 2441                                                | 103.22                  | 101.35            |                |             | 31.85                 | 5.46            | 35.44              | 223                 | 125                  | Peak    |
| 2500                                                | 40.18                   | 38.16             | 54             | -13.82      | 31.9                  | 5.53            | 35.41              | 223                 | 125                  | Average |
| 2500                                                | 55.25                   | 53.23             | 74             | -18.75      | 31.9                  | 5.53            | 35.41              | 223                 | 125                  | Peak    |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |                |             |                       |                 |                    |                     |                      |         |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2362                                                | 45.33                   | 43.7              | 54             | -8.67       | 31.76                 | 5.37            | 35.5               | 103                 | 148                  | Average |
| 2362                                                | 54.06                   | 52.43             | 74             | -19.94      | 31.76                 | 5.37            | 35.5               | 103                 | 148                  | Peak    |
| 2441                                                | 90.54                   | 88.67             |                |             | 31.85                 | 5.46            | 35.44              | 100                 | 53                   | Average |
| 2441                                                | 96.12                   | 94.25             |                |             | 31.85                 | 5.46            | 35.44              | 100                 | 53                   | Peak    |
| 2500                                                | 40.23                   | 38.21             | 54             | -13.77      | 31.9                  | 5.53            | 35.41              | 100                 | 53                   | Average |
| 2500                                                | 55.4                    | 53.38             | 74             | -18.6       | 31.9                  | 5.53            | 35.41              | 100                 | 53                   | Peak    |

Remarks:

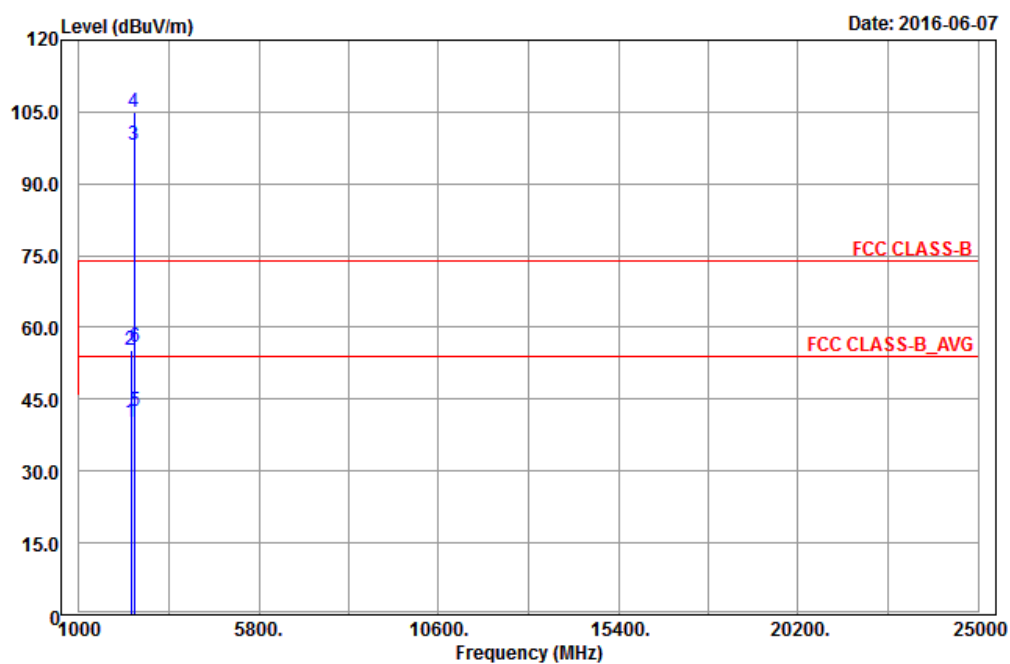
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin Value = Emission Level – Limit value

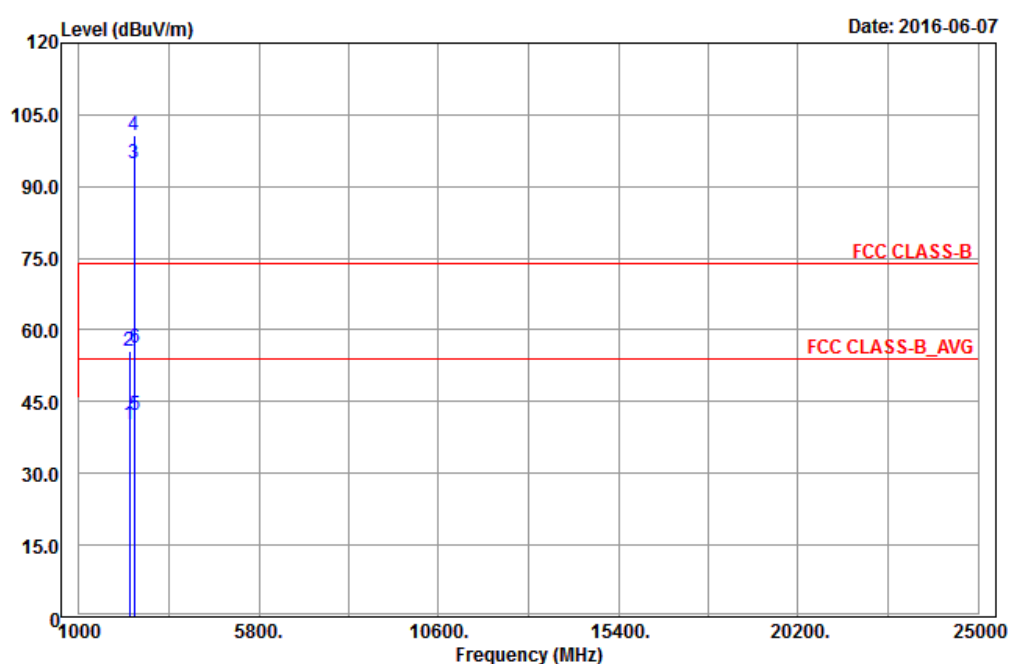
2. 2441 MHz: Fundamental Frequency

| 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          | Charles Hsiao             |

### Horizontal



### Vertical



### Antenna Polarity & Test Distance: Horizontal at 3 m

| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
|-----------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| 2390            | 40.35                   | 38.62             | 54             | -13.65      | 31.8                  | 5.4             | 35.47              | 200                 | 109                  | Average |
| 2390            | 55.4                    | 53.67             | 74             | -18.6       | 31.8                  | 5.4             | 35.47              | 200                 | 109                  | Peak    |
| 2480            | 98.2                    | 96.24             |                |             | 31.88                 | 5.5             | 35.42              | 200                 | 109                  | Average |
| 2480            | 104.87                  | 102.91            |                |             | 31.88                 | 5.5             | 35.42              | 200                 | 109                  | Peak    |
| 2500            | 42.57                   | 40.55             | 54             | -11.43      | 31.9                  | 5.53            | 35.41              | 200                 | 109                  | Average |
| 2500            | 56.05                   | 54.03             | 74             | -17.95      | 31.9                  | 5.53            | 35.41              | 200                 | 109                  | Peak    |

### Antenna Polarity & Test Distance: Vertical at 3 m

| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
|-----------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| 2344            | 40.34                   | 38.77             | 54             | -13.66      | 31.74                 | 5.33            | 35.5               | 114                 | 119                  | Average |
| 2344            | 55.57                   | 54                | 74             | -18.43      | 31.74                 | 5.33            | 35.5               | 114                 | 119                  | Peak    |
| 2480            | 94.93                   | 92.97             |                |             | 31.88                 | 5.5             | 35.42              | 114                 | 119                  | Average |
| 2480            | 100.68                  | 98.72             |                |             | 31.88                 | 5.5             | 35.42              | 114                 | 119                  | Peak    |
| 2488            | 42.32                   | 40.31             | 54             | -11.68      | 31.9                  | 5.53            | 35.42              | 114                 | 119                  | Average |
| 2488            | 56.28                   | 54.27             | 74             | -17.72      | 31.9                  | 5.53            | 35.42              | 114                 | 119                  | Peak    |

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

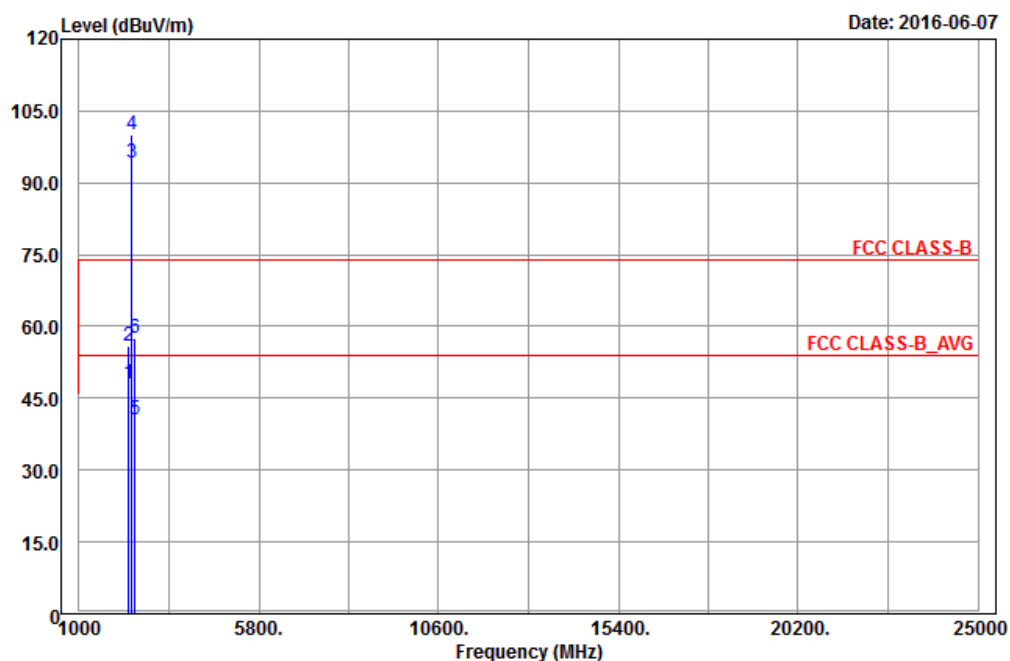
Margin Value = Emission Level – Limit value

2. 2480 MHz: Fundamental Frequency

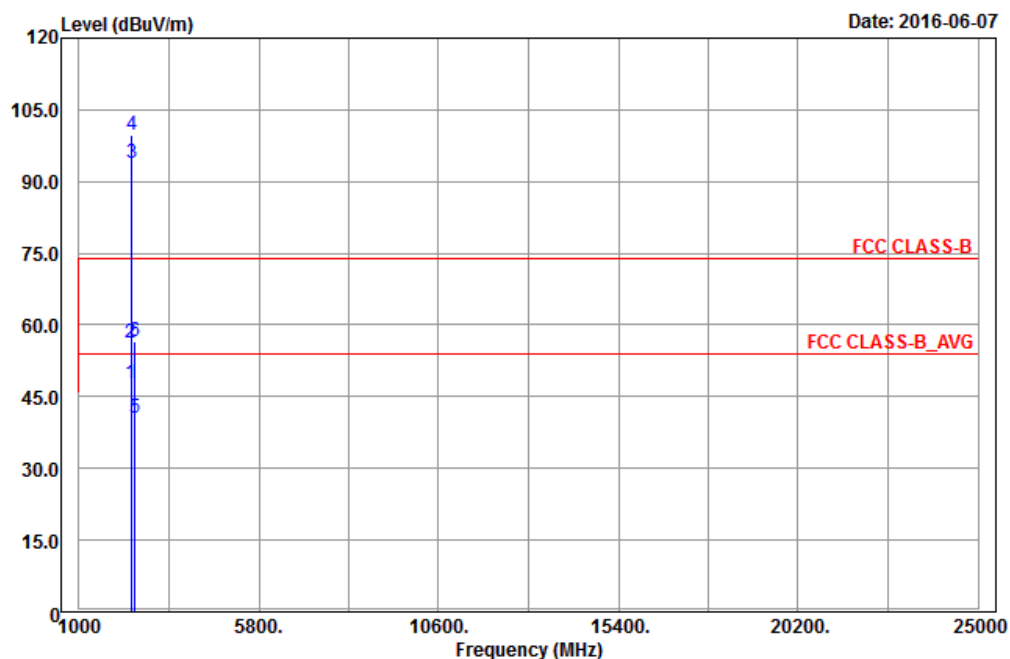
## Mode B

| 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          | Charles Hsiao             |

### Horizontal



### Vertical



| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |                |             |                       |                 |                    |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2322                                                | 47.94                   | 46.43             | 54             | -6.06       | 31.73                 | 5.3             | 35.52              | 156                 | 8                    | Average |
| 2322                                                | 55.82                   | 54.31             | 74             | -18.18      | 31.73                 | 5.3             | 35.52              | 156                 | 8                    | Peak    |
| 2402                                                | 94.04                   | 92.31             |                |             | 31.8                  | 5.4             | 35.47              | 152                 | 8                    | Average |
| 2402                                                | 100.04                  | 98.31             |                |             | 31.8                  | 5.4             | 35.47              | 152                 | 8                    | Peak    |
| 2484                                                | 40.52                   | 38.56             | 54             | -13.48      | 31.88                 | 5.5             | 35.42              | 152                 | 8                    | Average |
| 2484                                                | 57.4                    | 55.44             | 74             | -16.6       | 31.88                 | 5.5             | 35.42              | 152                 | 8                    | Peak    |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |                |             |                       |                 |                    |                     |                      |         |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2386                                                | 47.78                   | 46.07             | 54             | -6.22       | 31.8                  | 5.4             | 35.49              | 166                 | 152                  | Average |
| 2386                                                | 56.2                    | 54.49             | 74             | -17.8       | 31.8                  | 5.4             | 35.49              | 166                 | 152                  | Peak    |
| 2402                                                | 93.99                   | 92.26             |                |             | 31.8                  | 5.4             | 35.47              | 157                 | 360                  | Average |
| 2402                                                | 99.8                    | 98.07             |                |             | 31.8                  | 5.4             | 35.47              | 157                 | 360                  | Peak    |
| 2498                                                | 40.65                   | 38.63             | 54             | -13.35      | 31.9                  | 5.53            | 35.41              | 157                 | 360                  | Average |
| 2498                                                | 56.51                   | 54.49             | 74             | -17.49      | 31.9                  | 5.53            | 35.41              | 157                 | 360                  | Peak    |

Remarks:

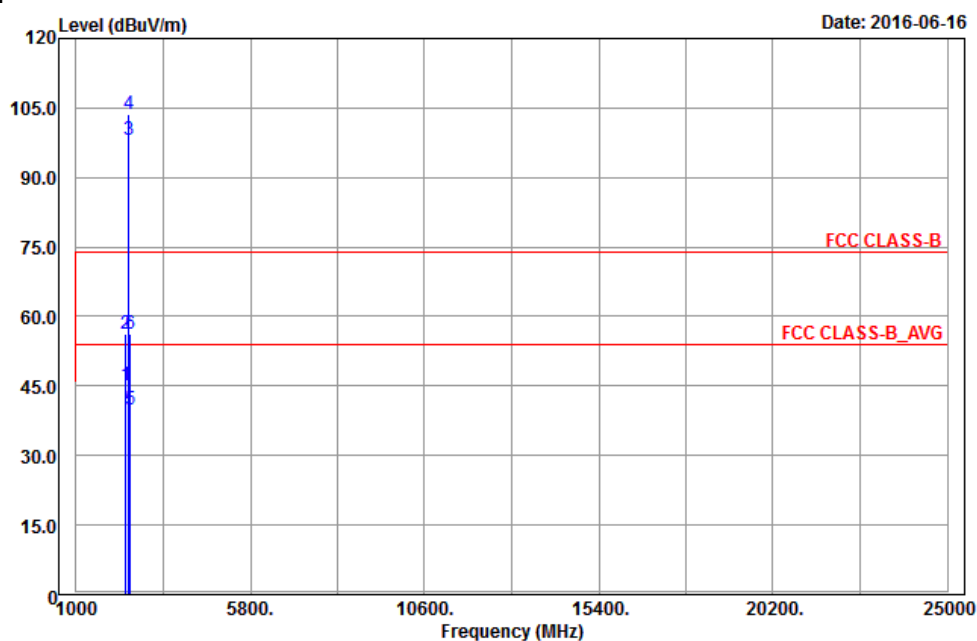
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin Value = Emission Level – Limit value

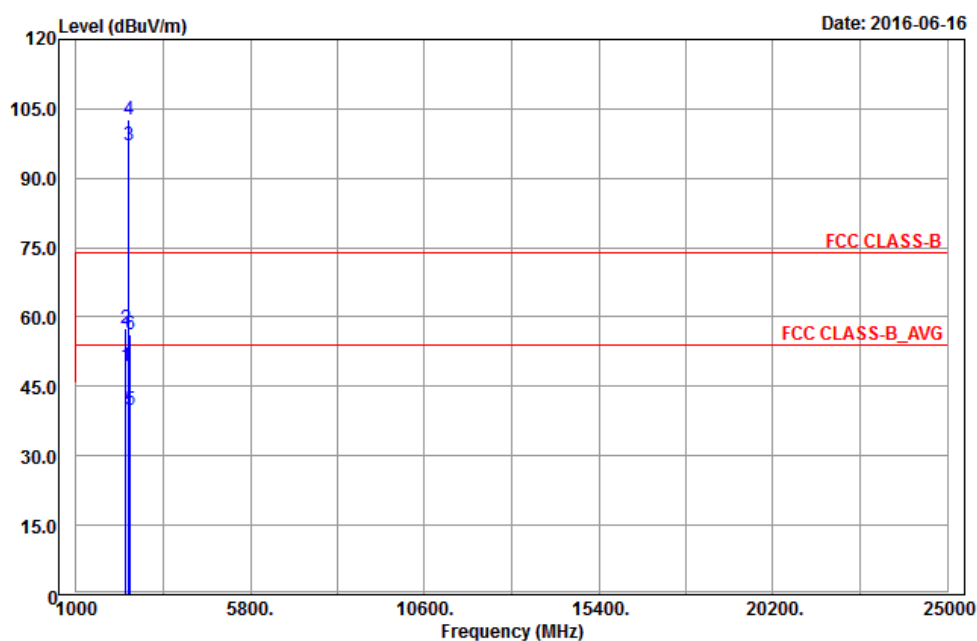
2. 2402 MHz: Fundamental Frequency

| 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          | Charles Hsiao             |

### Horizontal



### Vertical



| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |                |             |                       |                 |                    |                     |                      |         |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2362                                                | 45.17                   | 43.54             | 54             | -8.83       | 31.76                 | 5.37            | 35.5               | 262                 | 116                  | Average |
| 2362                                                | 56.37                   | 54.74             | 74             | -17.63      | 31.76                 | 5.37            | 35.5               | 262                 | 116                  | Peak    |
| 2441                                                | 98                      | 96.13             |                |             | 31.85                 | 5.46            | 35.44              | 262                 | 116                  | Average |
| 2441                                                | 103.6                   | 101.73            |                |             | 31.85                 | 5.46            | 35.44              | 262                 | 116                  | Peak    |
| 2496                                                | 40                      | 37.98             | 54             | -14         | 31.9                  | 5.53            | 35.41              | 262                 | 116                  | Average |
| 2496                                                | 56.37                   | 54.35             | 74             | -17.63      | 31.9                  | 5.53            | 35.41              | 262                 | 116                  | Peak    |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |                |             |                       |                 |                    |                     |                      |         |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
| 2362                                                | 49.21                   | 47.58             | 54             | -4.79       | 31.76                 | 5.37            | 35.5               | 142                 | 358                  | Average |
| 2362                                                | 57.57                   | 55.94             | 74             | -16.43      | 31.76                 | 5.37            | 35.5               | 142                 | 358                  | Peak    |
| 2441                                                | 97.09                   | 95.22             |                |             | 31.85                 | 5.46            | 35.44              | 142                 | 358                  | Average |
| 2441                                                | 102.62                  | 100.75            |                |             | 31.85                 | 5.46            | 35.44              | 142                 | 358                  | Peak    |
| 2500                                                | 39.94                   | 37.92             | 54             | -14.06      | 31.9                  | 5.53            | 35.41              | 142                 | 358                  | Average |
| 2500                                                | 56.22                   | 54.2              | 74             | -17.78      | 31.9                  | 5.53            | 35.41              | 142                 | 358                  | Peak    |

Remarks:

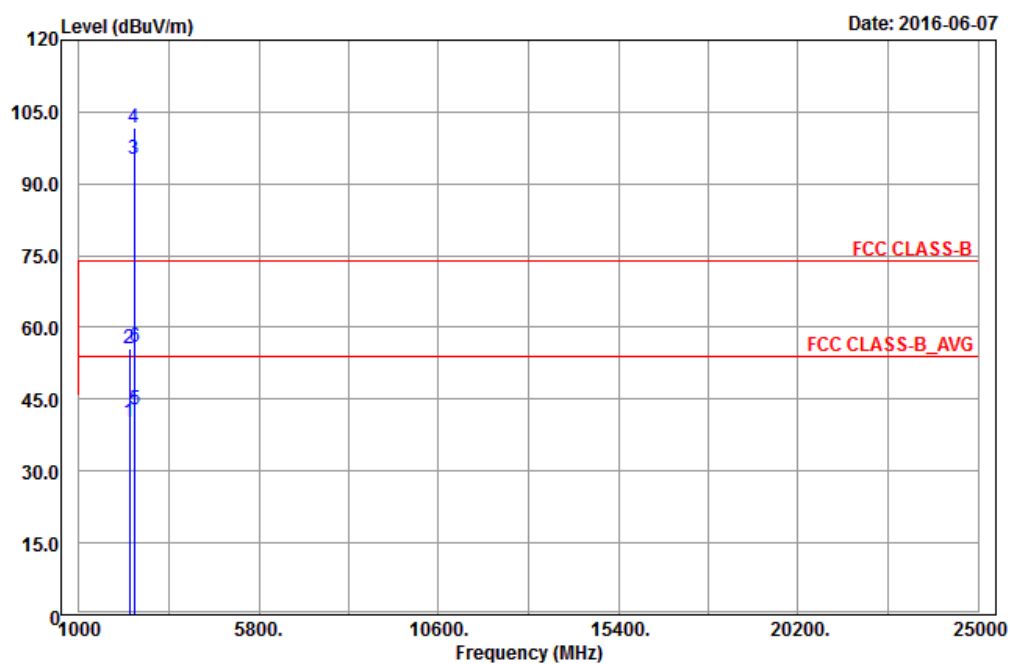
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin Value = Emission Level – Limit value

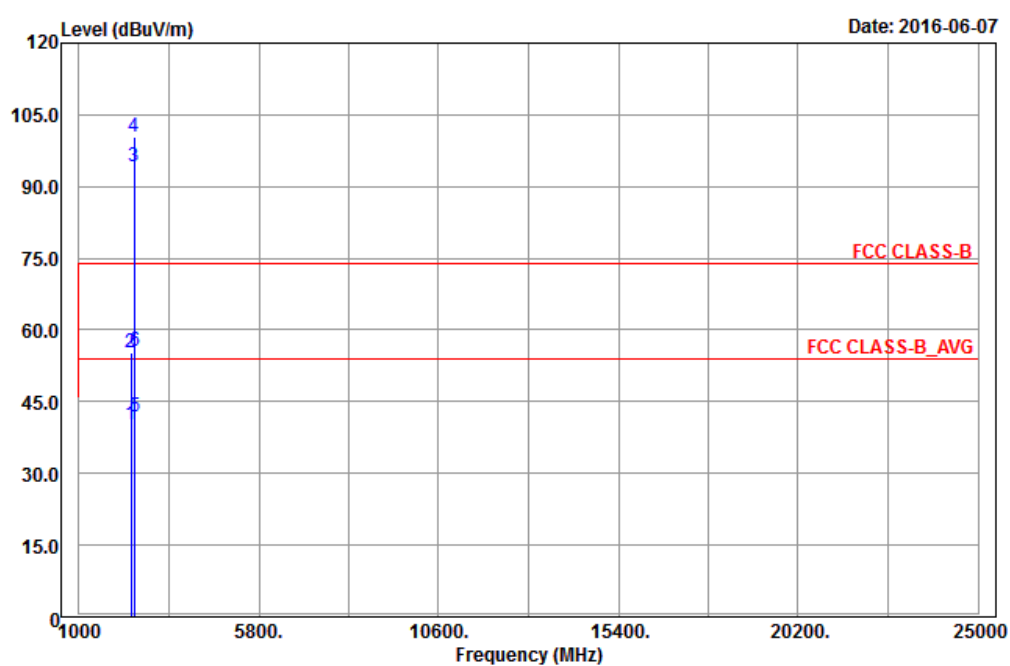
2. 2441 MHz: Fundamental Frequency

| 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          | Charles Hsiao             |

### Horizontal



### Vertical





### Antenna Polarity & Test Distance: Horizontal at 3 m

| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
|-----------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| 2336            | 40.13                   | 38.58             | 54             | -13.87      | 31.74                 | 5.33            | 35.52              | 129                 | 8                    | Average |
| 2336            | 55.59                   | 54.04             | 74             | -18.41      | 31.74                 | 5.33            | 35.52              | 129                 | 8                    | Peak    |
| 2480            | 95.17                   | 93.21             |                |             | 31.88                 | 5.5             | 35.42              | 129                 | 8                    | Average |
| 2480            | 101.69                  | 99.73             |                |             | 31.88                 | 5.5             | 35.42              | 129                 | 8                    | Peak    |
| 2484            | 42.78                   | 40.82             | 54             | -11.22      | 31.88                 | 5.5             | 35.42              | 129                 | 8                    | Average |
| 2484            | 56.07                   | 54.11             | 74             | -17.93      | 31.88                 | 5.5             | 35.42              | 129                 | 8                    | Peak    |

### Antenna Polarity & Test Distance: Vertical at 3 m

| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark  |
|-----------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| 2386            | 40.2                    | 38.49             | 54             | -13.8       | 31.8                  | 5.4             | 35.49              | 273                 | 152                  | Average |
| 2386            | 55.13                   | 53.42             | 74             | -18.87      | 31.8                  | 5.4             | 35.49              | 273                 | 152                  | Peak    |
| 2480            | 94.05                   | 92.09             |                |             | 31.88                 | 5.5             | 35.42              | 273                 | 152                  | Average |
| 2480            | 100.53                  | 98.57             |                |             | 31.88                 | 5.5             | 35.42              | 273                 | 152                  | Peak    |
| 2492            | 41.93                   | 39.91             | 54             | -12.07      | 31.9                  | 5.53            | 35.41              | 273                 | 152                  | Average |
| 2492            | 55.7                    | 53.68             | 74             | -18.3       | 31.9                  | 5.53            | 35.41              | 273                 | 152                  | Peak    |

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin Value = Emission Level – Limit value

2. 2480 MHz: Fundamental Frequency

### 9 kHz ~ 30 MHz DATA:

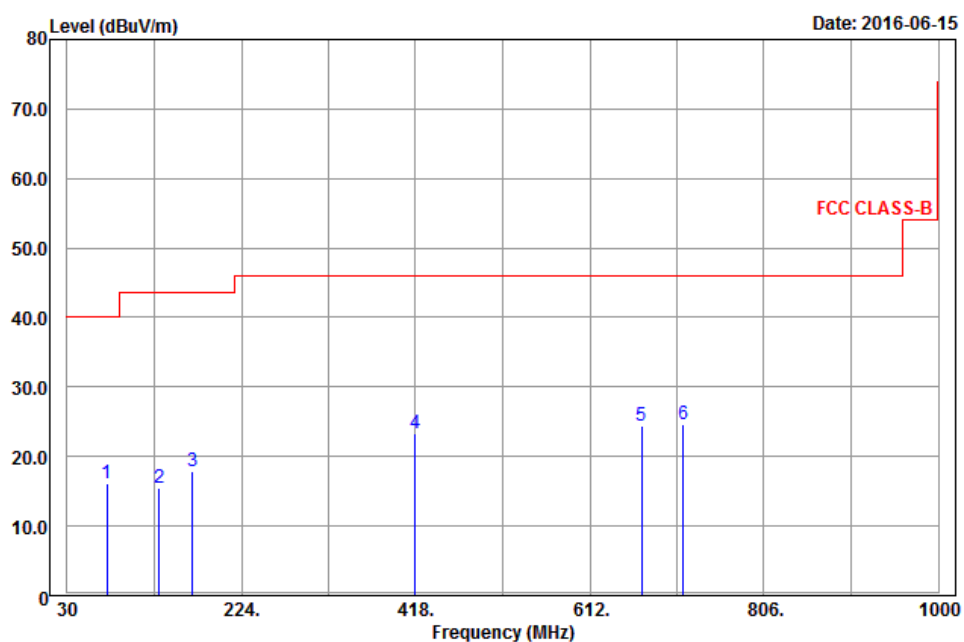
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

## 30 MHz ~ 1 GHz WORST-CASE DATA:

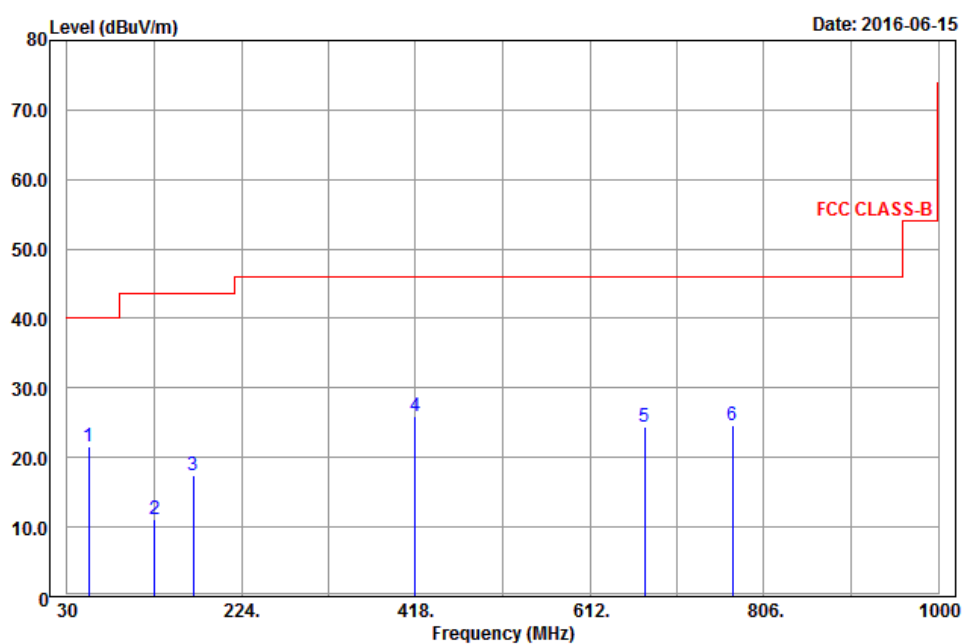
### Mode A

| EUT Test Condition       |                    | Measurement Detail |                              |
|--------------------------|--------------------|--------------------|------------------------------|
| Channel                  | Channel 39         | Frequency Range    | 30 MHz ~ 1 GHz               |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Quask-Peak (QP) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Charles Hsiao                |

### Horizontal



### Vertical



| Antenna Polarity & Test Distance: Horizontal at 3 m |                         |                   |                |             |                       |                 |                    |                     |                      |        |
|-----------------------------------------------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|--------|
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 74.28                                               | 16.18                   | 39.06             | 40             | -23.82      | 8.23                  | 1.11            | 32.22              | 174                 | 325                  | Peak   |
| 132.87                                              | 15.37                   | 37                | 43.5           | -28.13      | 9.23                  | 1.38            | 32.24              | 123                 | 180                  | Peak   |
| 169.86                                              | 17.84                   | 38.56             | 43.5           | -25.66      | 10                    | 1.52            | 32.24              | 136                 | 134                  | Peak   |
| 417.6                                               | 23.25                   | 35.23             | 46             | -22.75      | 17.81                 | 2.41            | 32.2               | 147                 | 79                   | Peak   |
| 669.6                                               | 24.42                   | 30.32             | 46             | -21.58      | 23.18                 | 3.05            | 32.13              | 183                 | 231                  | Peak   |
| 715.8                                               | 24.72                   | 30.45             | 46             | -21.28      | 23.27                 | 3.11            | 32.11              | 158                 | 25                   | Peak   |
| Antenna Polarity & Test Distance: Vertical at 3 m   |                         |                   |                |             |                       |                 |                    |                     |                      |        |
| Frequency (MHz)                                     | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 54.3                                                | 21.59                   | 45.56             | 40             | -18.41      | 7.36                  | 0.9             | 32.23              | 121                 | 25                   | Peak   |
| 127.2                                               | 11.16                   | 32.95             | 43.5           | -32.34      | 9.07                  | 1.38            | 32.24              | 190                 | 66                   | Peak   |
| 170.13                                              | 17.4                    | 38.12             | 43.5           | -26.1       | 10                    | 1.52            | 32.24              | 170                 | 117                  | Peak   |
| 417.6                                               | 25.99                   | 37.97             | 46             | -20.01      | 17.81                 | 2.41            | 32.2               | 170                 | 17                   | Peak   |
| 673.1                                               | 24.52                   | 30.19             | 46             | -21.48      | 23.4                  | 3.05            | 32.12              | 120                 | 38                   | Peak   |
| 771.1                                               | 24.65                   | 30.04             | 46             | -21.35      | 23.45                 | 3.27            | 32.11              | 177                 | 246                  | Peak   |

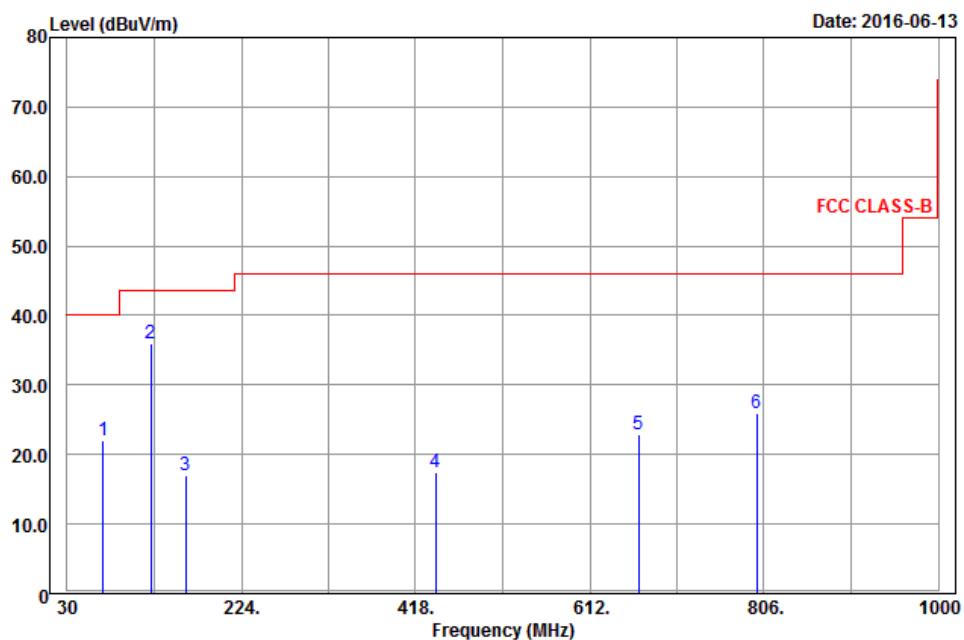
Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin Value = Emission Level – Limit value

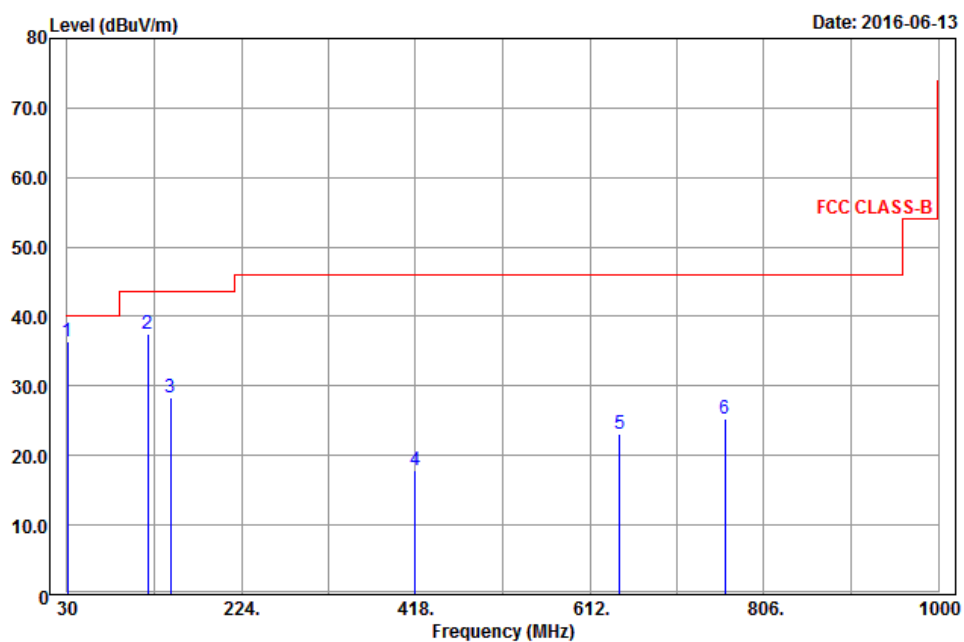
## Mode B

| EUT Test Condition       |                    | Measurement Detail |                              |
|--------------------------|--------------------|--------------------|------------------------------|
| Channel                  | Channel 39         | Frequency Range    | 30 MHz ~ 1 GHz               |
| Input Power              | 120 Vac, 60 Hz     | Detector Function  | Peak (PK)<br>Quask-Peak (QP) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By          | Charles Hsiao                |

## Horizontal



## Vertical



### Antenna Polarity & Test Distance: Horizontal at 3 m

| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
|-----------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|--------|
| 69.96           | 22.02                   | 45.03             | 40             | -17.98      | 8.1                   | 1.11            | 32.22              | 200                 | 0                    | Peak   |
| 123.42          | 35.93                   | 57.92             | 43.5           | -7.57       | 8.87                  | 1.38            | 32.24              | 200                 | 0                    | Peak   |
| 162.03          | 17.08                   | 37.17             | 43.5           | -26.42      | 10.65                 | 1.52            | 32.26              | 200                 | 0                    | Peak   |
| 440.7           | 17.48                   | 29.26             | 46             | -28.52      | 17.89                 | 2.49            | 32.16              | 100                 | 0                    | Peak   |
| 666.1           | 22.96                   | 29.13             | 46             | -23.04      | 22.97                 | 2.99            | 32.13              | 100                 | 0                    | Peak   |
| 798.4           | 25.85                   | 30.17             | 46             | -20.15      | 24.42                 | 3.32            | 32.06              | 100                 | 0                    | Peak   |

### Antenna Polarity & Test Distance: Vertical at 3 m

| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
|-----------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|--------|
| 30.81           | 36.33                   | 50.66             | 40             | -3.67       | 17.19                 | 0.74            | 32.26              | 200                 | 0                    | Peak   |
| 119.91          | 37.57                   | 59.84             | 43.5           | -5.93       | 8.7                   | 1.28            | 32.25              | 200                 | 0                    | Peak   |
| 144.75          | 28.3                    | 49.46             | 43.5           | -15.2       | 9.73                  | 1.38            | 32.27              | 200                 | 0                    | Peak   |
| 417.6           | 17.85                   | 29.83             | 46             | -28.15      | 17.81                 | 2.41            | 32.2               | 100                 | 0                    | Peak   |
| 645.1           | 23.16                   | 30.22             | 46             | -22.84      | 22.1                  | 2.99            | 32.15              | 100                 | 0                    | Peak   |
| 762.7           | 25.26                   | 30.81             | 46             | -20.74      | 23.35                 | 3.22            | 32.12              | 100                 | 0                    | Peak   |

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin Value = Emission Level – Limit value

## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

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

Note: 1. The lower limit shall apply at the transition frequencies.  
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.  
 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### 4.2.2 Test Instruments

| Description & Manufacturer                  | Model No.                | Serial No.     | Date Of Calibration | Due Date Of Calibration |
|---------------------------------------------|--------------------------|----------------|---------------------|-------------------------|
| Test Receiver<br>ROHDE & SCHWARZ            | ESCI                     | 100613         | Nov. 16, 2015       | Nov. 15, 2016           |
| RF signal cable (with<br>10dB PAD)<br>Woken | 5D-FB                    | Cable-cond1-01 | Dec. 26, 2015       | Dec. 25, 2016           |
| LISN<br>ROHDE & SCHWARZ<br>(EUT)            | ESH3-Z5                  | 835239/001     | Feb. 26, 2016       | Feb. 25, 2017           |
| LISN<br>ROHDE & SCHWARZ<br>(Peripheral)     | ESH3-Z5                  | 100311         | Jul. 24, 2015       | Jul. 23, 2016           |
| Software<br>ADT                             | BV ADT_Cond_<br>V7.3.7.3 | NA             | 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 HwaYa Shielded Room 1.  
 3. The VCCI Site Registration No. is C-2040.

#### 4.2.3 Test Procedures

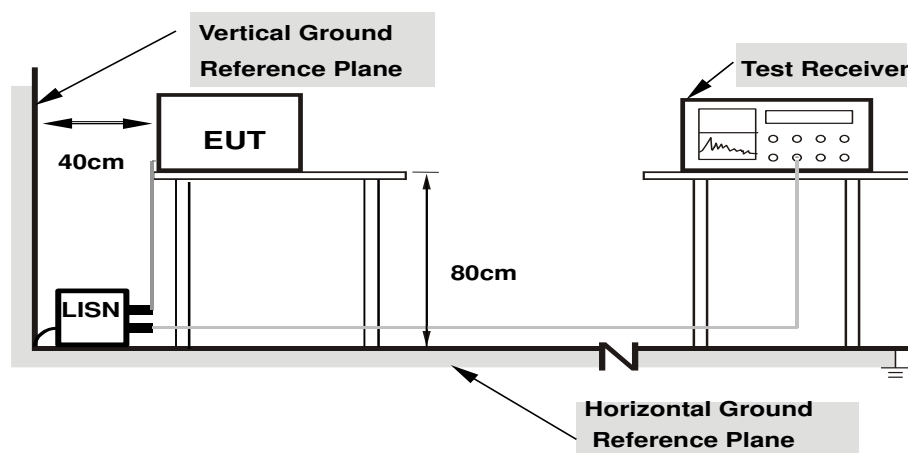
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling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

**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

#### 4.2.4 Deviation from Test Standard

No deviation.

#### 4.2.5 Test Setup



- Note:**
- 1.Support units were connected to second LISN.
  - 2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

#### 4.2.6 EUT Operating Condition

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

#### 4.2.7 Test Results

#### CONDUCTED WORST-CASE DATA : 8DPSK

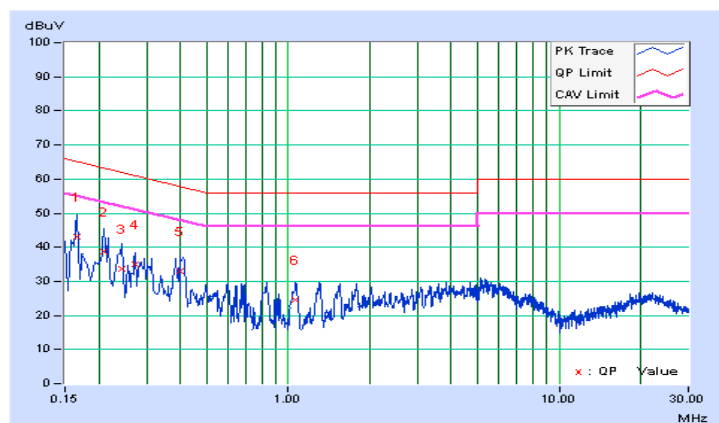
##### Mode A

|                 |                |                                          |                                      |
|-----------------|----------------|------------------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power     | 120Vac, 60Hz   | Environmental Conditions                 | 25°C, 65%RH                          |
| Tested by       | Toby Tian      | Test Date                                | 2016/6/9                             |

| Phase Of Power : Line (L) |                 |                        |                      |       |                       |       |              |       |             |        |
|---------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No                        | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |       | Emission Level (dBuV) |       | Limit (dBuV) |       | Margin (dB) |        |
|                           |                 |                        | Q.P.                 | AV.   | Q.P.                  | AV.   | Q.P.         | AV.   | Q.P.        | AV.    |
| 1                         | 0.16564         | 10.02                  | 33.12                | 15.01 | 43.14                 | 25.03 | 65.18        | 55.18 | -22.04      | -30.15 |
| 2                         | 0.20865         | 10.03                  | 28.54                | 17.31 | 38.57                 | 27.34 | 63.26        | 53.26 | -24.68      | -25.91 |
| 3                         | 0.24384         | 10.05                  | 23.62                | 8.71  | 33.67                 | 18.76 | 61.96        | 51.96 | -28.29      | -33.20 |
| 4                         | 0.27120         | 10.06                  | 24.86                | 10.06 | 34.92                 | 20.12 | 61.08        | 51.08 | -26.16      | -30.96 |
| 5                         | 0.40024         | 10.12                  | 22.91                | 10.33 | 33.03                 | 20.45 | 57.85        | 47.85 | -24.82      | -27.40 |
| 6                         | 1.06494         | 10.20                  | 14.45                | 7.03  | 24.65                 | 17.23 | 56.00        | 46.00 | -31.35      | -28.77 |

##### Remarks:

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



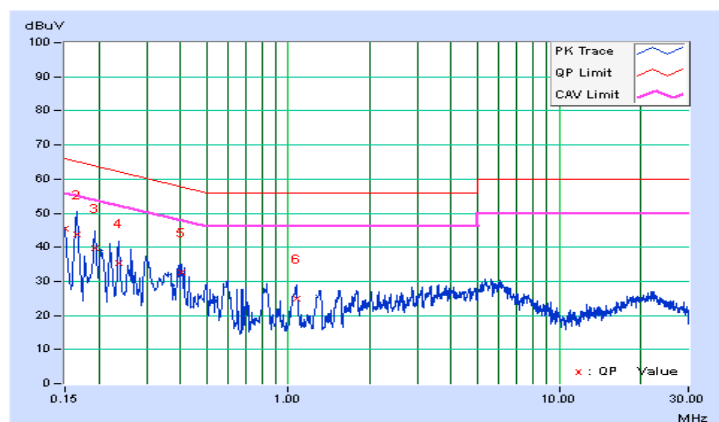


|                 |                |                                          |                                      |
|-----------------|----------------|------------------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power     | 120Vac, 60Hz   | Environmental Conditions                 | 25°C, 65%RH                          |
| Tested by       | Toby Tian      | Test Date                                | 2016/6/9                             |

| Phase Of Power : Neutral (N) |                 |                        |                      |       |                       |       |              |       |             |        |
|------------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No                           | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |       | Emission Level (dBuV) |       | Limit (dBuV) |       | Margin (dB) |        |
|                              |                 |                        | Q.P.                 | AV.   | Q.P.                  | AV.   | Q.P.         | AV.   | Q.P.        | AV.    |
| 1                            | 0.15000         | 10.03                  | 35.29                | 18.01 | 45.32                 | 28.04 | 66.00        | 56.00 | -20.68      | -27.96 |
| 2                            | 0.16564         | 10.03                  | 33.64                | 14.44 | 43.67                 | 24.47 | 65.18        | 55.18 | -21.51      | -30.71 |
| 3                            | 0.19301         | 10.04                  | 29.58                | 12.63 | 39.62                 | 22.67 | 63.91        | 53.91 | -24.29      | -31.24 |
| 4                            | 0.23602         | 10.06                  | 25.31                | 10.33 | 35.37                 | 20.39 | 62.24        | 52.24 | -26.87      | -31.85 |
| 5                            | 0.40160         | 10.13                  | 22.37                | 9.98  | 32.50                 | 20.11 | 57.82        | 47.82 | -25.32      | -27.71 |
| 6                            | 1.07308         | 10.22                  | 14.82                | 7.63  | 25.04                 | 17.85 | 56.00        | 46.00 | -30.96      | -28.15 |

Remarks:

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



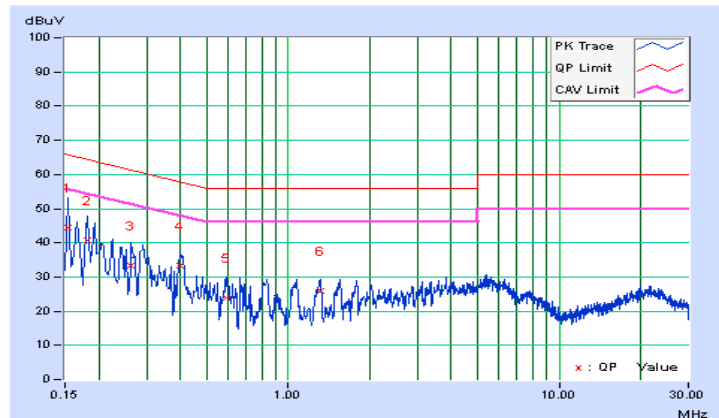
## Mode B

|                 |                |                                          |                                      |
|-----------------|----------------|------------------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power     | 120Vac, 60Hz   | Environmental Conditions                 | 25°C, 65%RH                          |
| Tested by       | Toby Tian      | Test Date                                | 2016/6/9                             |

| Phase Of Power : Line (L) |                 |                        |                      |       |                       |       |              |       |             |        |
|---------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No                        | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |       | Emission Level (dBuV) |       | Limit (dBuV) |       | Margin (dB) |        |
|                           |                 |                        | Q.P.                 | AV.   | Q.P.                  | AV.   | Q.P.         | AV.   | Q.P.        | AV.    |
| 1                         | 0.15391         | 10.02                  | 34.59                | 17.30 | 44.61                 | 27.32 | 65.79        | 55.79 | -21.18      | -28.47 |
| 2                         | 0.18128         | 10.02                  | 30.88                | 13.04 | 40.90                 | 23.06 | 64.43        | 54.43 | -23.52      | -31.36 |
| 3                         | 0.26346         | 10.06                  | 23.15                | 8.16  | 33.21                 | 18.22 | 61.32        | 51.32 | -28.11      | -33.10 |
| 4                         | 0.40055         | 10.12                  | 23.07                | 10.55 | 33.19                 | 20.67 | 57.84        | 47.84 | -24.65      | -27.17 |
| 5                         | 0.58792         | 10.15                  | 13.81                | 6.55  | 23.96                 | 16.70 | 56.00        | 46.00 | -32.04      | -29.30 |
| 6                         | 1.31099         | 10.22                  | 15.70                | 7.95  | 25.92                 | 18.17 | 56.00        | 46.00 | -30.08      | -27.83 |

### Remarks:

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

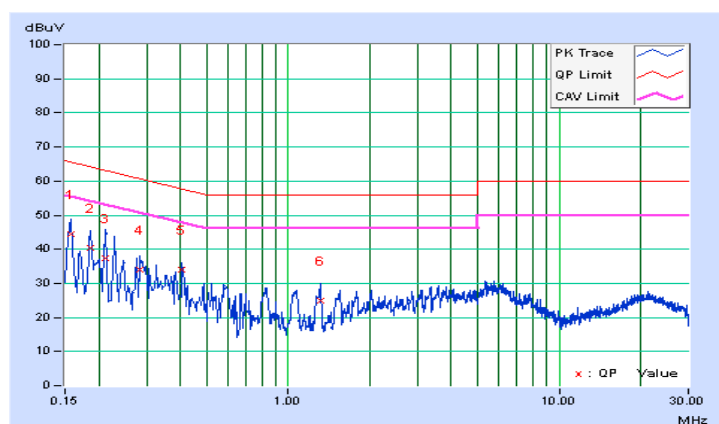


|                 |                |                                          |                                      |
|-----------------|----------------|------------------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power     | 120Vac, 60Hz   | Environmental Conditions                 | 25°C, 65%RH                          |
| Tested by       | Toby Tian      | Test Date                                | 2016/6/9                             |

| Phase Of Power : Neutral (N) |                 |                        |                      |       |                       |       |              |       |             |        |
|------------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No                           | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |       | Emission Level (dBuV) |       | Limit (dBuV) |       | Margin (dB) |        |
|                              |                 |                        | Q.P.                 | AV.   | Q.P.                  | AV.   | Q.P.         | AV.   | Q.P.        | AV.    |
| 1                            | 0.15782         | 10.03                  | 34.34                | 16.11 | 44.37                 | 26.14 | 65.58        | 55.58 | -21.21      | -29.44 |
| 2                            | 0.18508         | 10.04                  | 30.47                | 12.28 | 40.51                 | 22.32 | 64.25        | 54.25 | -23.75      | -31.94 |
| 3                            | 0.21256         | 10.05                  | 27.44                | 12.45 | 37.49                 | 22.50 | 63.10        | 53.10 | -25.62      | -30.61 |
| 4                            | 0.28294         | 10.08                  | 24.05                | 9.49  | 34.13                 | 19.57 | 60.73        | 50.73 | -26.60      | -31.16 |
| 5                            | 0.40415         | 10.13                  | 23.82                | 12.22 | 33.95                 | 22.35 | 57.77        | 47.77 | -23.82      | -25.42 |
| 6                            | 1.31127         | 10.23                  | 14.52                | 6.98  | 24.75                 | 17.21 | 56.00        | 46.00 | -31.25      | -28.79 |

Remarks:

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

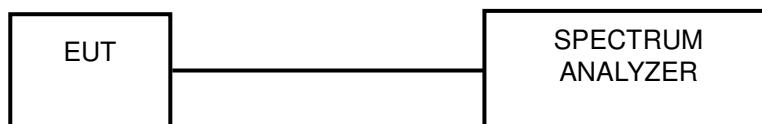


### 4.3 Maximum Output Power

#### 4.3.1 Limits of Maximum Output Power Measurement

The Maximum Output Power Measurement is 125 mW.

#### 4.3.2 Test Setup



#### 4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 Test Procedure

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3 MHz RBW and 10 MHz VBW.
- Measure the captured power within the band and recording the plot.
- Repeat above procedures until all frequencies required were complete.

#### 4.3.5 Deviation from Test Standard

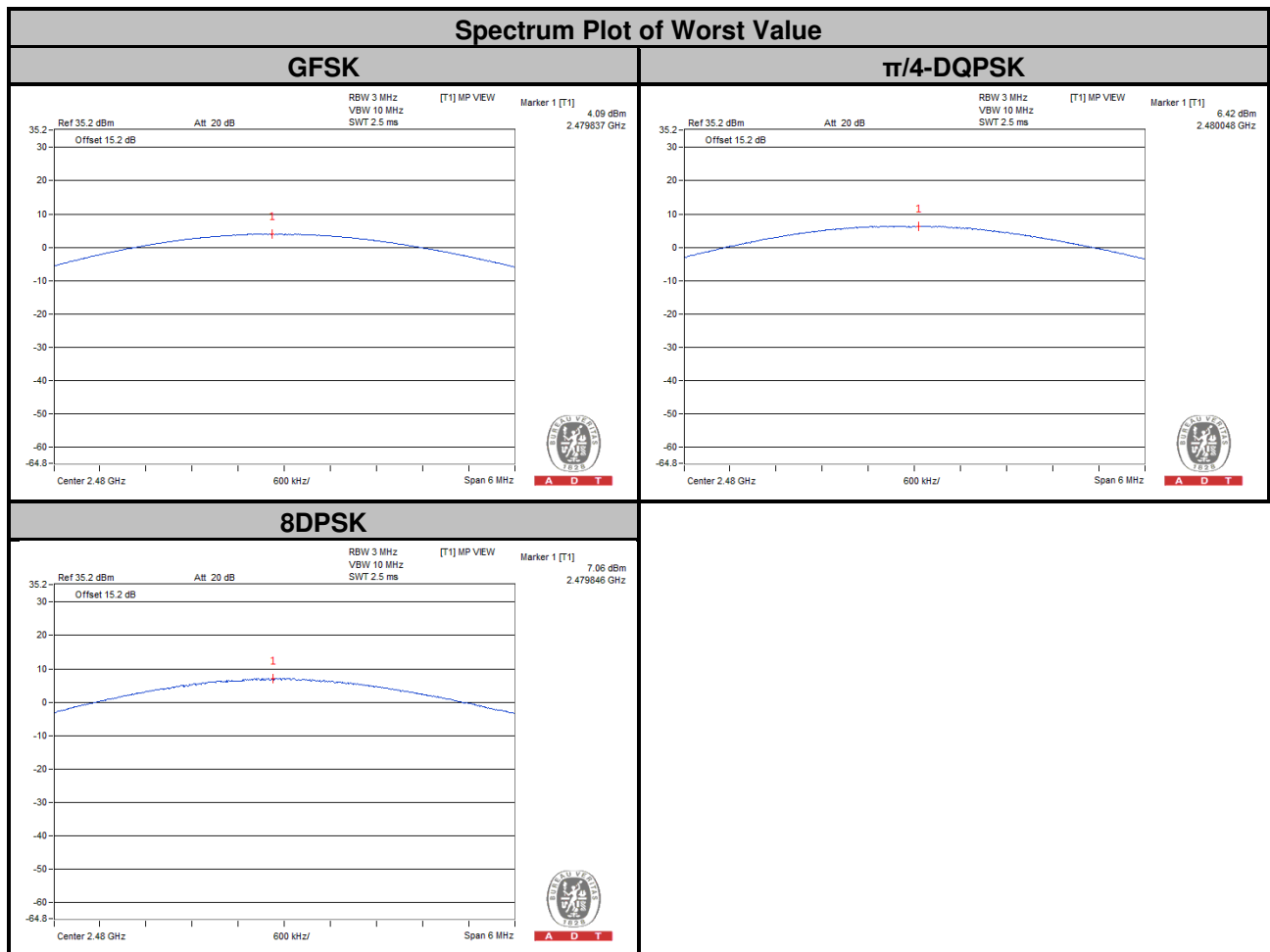
No deviation.

#### 4.3.6 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

#### 4.3.7 Test Results

| Channel | Frequency (MHz) | Output Power (mW) |                |       | Output Power (dBm) |                |       | Power Limit (mW) | Pass / Fail |
|---------|-----------------|-------------------|----------------|-------|--------------------|----------------|-------|------------------|-------------|
|         |                 | GFSK              | $\pi/4$ -DQPSK | 8DPSK | GFSK               | $\pi/4$ -DQPSK | 8DPSK |                  |             |
| 0       | 2402            | 2.213             | 3.750          | 4.335 | 3.45               | 5.74           | 6.37  | 125              | PASS        |
| 39      | 2441            | 2.466             | 4.217          | 4.853 | 3.92               | 6.25           | 6.86  | 125              | PASS        |
| 78      | 2480            | 2.564             | 4.385          | 5.082 | 4.09               | 6.42           | 7.06  | 125              | PASS        |



## 5 Pictures of Test Arrangements

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

## Appendix – Information on 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 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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