

## FCC Test Report (BT-EDR)

**Report No.:** RF161216E08C-3

**FCC ID:** UAY-W8997-M1216

**Test Model:** W8997-M1216

**Received Date:** June 18, 2018

**Test Date:** June 27 to July 10, 2018

**Issued Date:** July 13, 2018

**Applicant:** Marvell Semiconductor, Inc.

**Address:** 5488 Marvell Lane, Santa Clara CA95054 USA

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

**Lab Address:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

**Test Location:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

**FCC Registration /  
Designation Number:** 723255 / TW2022



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### Release Control Record

| Issue No.      | Description       | Date Issued   |
|----------------|-------------------|---------------|
| RF161216E08C-3 | Original release. | July 13, 2018 |

## 1 Certificate of Conformity

**Product:** IEEE 802.11 2X2 MU-MIMO ac/a/b/g/n Wireless LAN + Bluetooth NGFF Module

**Brand:** Marvell

**Test Model:** W8997-M1216

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** Marvell Semiconductor, Inc.

**Test Date:** June 27 to July 10, 2018

**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 :** Wendy Wu, **Date:** July 13, 2018  
Wendy Wu / Specialist

**Approved by :** May Chen, **Date:** July 13, 2018  
May Chen / Manager

## 2 Summary of Test Results

### 47 CFR FCC Part 15, Subpart C (SECTION 15.247)

| FCC Clause                     | Test Item                                  | Result | Remarks  |
|--------------------------------|--|--------|--|
| 15.247(b)                      | Maximum Peak Output Power                  | PASS   | Meet the requirement of limit.   |
| 15.205 & 209<br>&<br>15.247(d) | Radiated Emissions & Band Edge Measurement | PASS   | Meet the requirement of limit.<br>Minimum passing margin is -4.4dB at 298.66MHz. |
| 15.203                         | Antenna Requirement                        | PASS   | Antenna connector are i-pex(MHF), RP-SMA not a standard connector.               |

**NOTE:** If The Frequency Hopping System operating in 2400-2483.5MHz band and the output power less than 125mW. The hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of hopping channel whichever is greater.

### 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) (±) |
|--------------------------------|---------------|--------------------------------|
| Radiated Emissions up to 1 GHz | 30MHz ~ 1GHz  | 5.33 dB                        |
| Radiated Emissions above 1 GHz | 1GHz ~ 6GHz   | 5.10 dB                        |
|                                | 6GHz ~ 18GHz  | 4.85 dB                        |
|                                | 18GHz ~ 40GHz | 5.24 dB                        |

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT (BT-EDR)

|                       |   |
|-----------------------|---|
| Product               | IEEE 802.11 2X2 MU-MIMO ac/a/b/g/n Wireless LAN + Bluetooth NGFF Module |
| Brand                 | Marvell   |
| Test Model            | W8997-M1216   |
| Status of EUT         | ENGINEERING SAMPLE  |
| Power Supply Rating   | DC 3.3V from host equipment   |
| Modulation Type       | GFSK, $\pi/4$ -DQPSK, 8DPSK   |
| Modulation Technology | FHSS  |
| Transfer Rate         | Up to 3Mbps   |
| Operating Frequency   | 2402MHz ~ 2480MHz   |
| Number of Channel     | 79  |
| Output Power          | 4.436mW   |
| Antenna Type          | Refer to Note   |
| Antenna Connector     | Refer to Note   |
| Accessory Device      | NA  |
| Data Cable Supplied   | NA  |

Note:

1. This report is prepared for FCC class II permissive change. The difference compared with the Report No.: RF161216E08-3 as the following:

◆ Add new antennas as following table:

| Original     |            |                      |               |                        |                       |              |                |
|--------------|------------|----------------------|---------------|------------------------|-----------------------|--------------|----------------|
| Antenna Set. | Brand      | Model                | Chain No.     | Antenna Net. Gain(dBi) | Frequency range (MHz) | Antenna Type | Connector Type |
| 1            | MAG.LAYERS | MSA-4008-25GC1-A1    | Chain 0(Aux)  | 2.98                   | 2400~2500             | PIFA         | i-pex(MHF)     |
|              |            |                      |               | 5.16                   | 4900~5900             |              |                |
|              |            |                      | Chain 1(Main) | 2.98                   | 2400~2500             |              |                |
|              |            |                      |               | 5.16                   | 4900~5900             |              |                |
| Newly        |            |                      |               |                        |                       |              |                |
| Antenna Set. | Brand      | Model                | Chain No.     | Antenna Net. Gain(dBi) | Frequency range (MHz) | Antenna Type | Connector Type |
| 2            | Bondale    | G-RA0K10090176-1436B | Chain 0(Aux)  | 1.9                    | 2400~2500             | Dipole       | RP-SMA         |
|              |            |                      |               | 3.6                    | 4900~5800             |              |                |
|              |            |                      | Chain 1(Main) | 1.9                    | 2400~2500             |              |                |
|              |            |                      |               | 3.6                    | 4900~5800             |              |                |
| 3            | San Jose   | UEN-201              | Chain 0(Aux)  | 2.4                    | 2400~2500             | Dipole       | RP-SMA         |
|              |            |                      |               | 4.4                    | 4900~5800             |              |                |
|              |            |                      | Chain 1(Main) | 2.4                    | 2400~2500             |              |                |
|              |            |                      |               | 4.4                    | 4900~5800             |              |                |

Note:

1. Max. gain was selected for Antenna Port Conducted Measurement test.

2. Antenna Set. 3 was selected for Radiated Emissions test.

2. According to above condition, only Conducted output power and Radiated Emissions test items need to be performed. And all data were verified to meet the requirements.

3. There are WLAN, BT technology used for the EUT.

4. Simultaneously transmission condition.

| Condition | Technology    |           |
|-----------|---------------|-----------|
| 1         | WLAN (2.4GHz) | Bluetooth |
| 2         | WLAN (5GHz)   | Bluetooth |

**Note:** The emission of the simultaneous operation has been evaluated and no non-compliance was found.

5. 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 for BT-EDR mode:

| 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 | APCM |             |
| -                  | √             | √         | √    |             |

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz      **RE $<$ 1G**: Radiated Emission below 1GHz  
**APCM**: Antenna Port Conducted Measurement

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

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

| 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 1GHz):

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

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | PACKET TYPE |
|-------------------|----------------|-----------------------|-----------------|-------------|
| 0 to 78           | 0              | FHSS                  | 8DPSK           | 3DH5        |

#### Antenna Port Conducted Measurement:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- 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.

| 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        |

**Test Condition:**

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER (System) | TESTED BY     |
|---------------|--------------------------|----------------------|---------------|
| RE $\geq$ 1G  | 22deg. C, 64%RH          | 120Vac, 60Hz         | Eason Tseng   |
| RE<1G         | 24deg. C, 65%RH          | 120Vac, 60Hz         | Frank Chuang  |
| APCM          | 25deg. C, 60%RH          | 120Vac, 60Hz         | Anderson Chen |

### 3.3 Description of Support Units

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

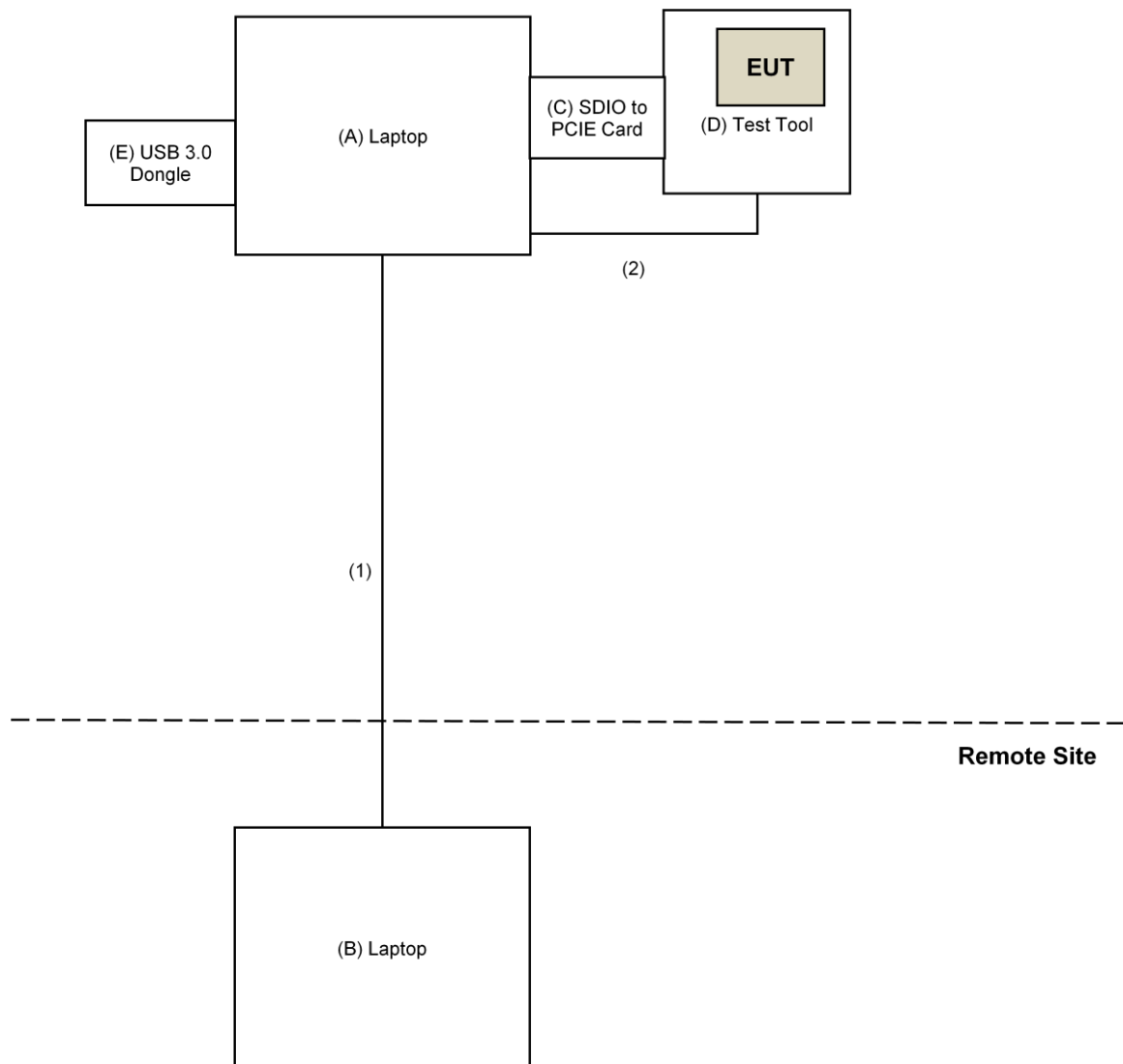
| ID | Product           | Brand     | Model No.           | Serial No. | FCC ID  | Remarks            |
|----|-------------------|-----------|---------------------|------------|---------|--------------------|
| A. | Laptop            | DELL      | E6420               | B92T3R1    | FCC DoC | Provided by Lab    |
| B. | Laptop            | HP        | Pavilion 14-ab023TU | 5CD5340WXZ | NA      | Provided by Lab    |
| C. | SDIO to PCIE Card | AzureWave | NA                  | NA         | NA      | Supplied by client |
| D. | Test Tool         | AzureWave | NA                  | NA         | NA      | Supplied by client |
| E. | USB 3.0 Dongle    | Transcend | JF790               | NA         | NA      | Supplied by client |

Note:

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

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks         |
|----|--------------|------|------------|--------------------|--------------|-----------------|
| 1. | RJ-45 Cable  | 1    | 10         | No                 | 0            | Provided by Lab |
| 2. | USB Cable    | 1    | 1.4        | Yes                | 0            | Provided by Lab |

### 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)**

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 20dB 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 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

#### 4.1.2 Test Instruments

##### For Output power test:

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| Spectrum Analyzer R&S      | FSV40     | 100964     | June 20, 2018   | June 19, 2019    |
| Power meter Anritsu        | ML2495A   | 1014008    | May 09, 2018    | May 08, 2019     |
| Power sensor Anritsu       | MA2411B   | 0917122    | May 09, 2018    | May 08, 2019     |

- NOTE:**
1. The test was performed in Oven room 2.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. Tested Date: July 10, 2018

**For other test:**

| DESCRIPTION & MANUFACTURER                          | MODEL NO.   | SERIAL NO.                    | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|-------------------------------|-----------------|------------------|
| Test Receiver<br>Keysight                           | N9038A  | MY54450088                    | July 08, 2017   | July 07, 2018    |
| Pre-Amplifier<br>EMCI                               | EMC001340   | 980142                        | Feb. 09, 2018   | Feb. 08, 2019    |
| Loop Antenna <sup>(*)</sup><br>Electro-Metrics      | EM-6879   | 264                           | Dec. 16, 2016   | Dec. 15, 2018    |
| RF Cable  | NA  | LOOPCAB-001<br>LOOPCAB-002    | Jan. 15, 2018   | Jan. 14, 2019    |
| Pre-Amplifier<br>Mini-Circuits                      | ZFL-1000VH2B  | AMP-ZFL-01                    | Nov. 09, 2017   | Nov. 08, 2018    |
| Trilog Broadband Antenna<br>SCHWARZBECK             | VULB 9168   | 9168-406                      | Nov. 29, 2017   | Nov. 28, 2018    |
| RF Cable  | 8D  | 966-4-1<br>966-4-2<br>966-4-3 | Mar. 21, 2018   | Mar. 20, 2019    |
| Fixed attenuator<br>Mini-Circuits                   | UNAT-5+   | PAD-3m-4-01                   | Oct. 03, 2017   | Oct. 02, 2018    |
| Horn_Antenna<br>SCHWARZBECK                         | BBHA 9120D  | 9120D-783                     | Dec. 12, 2017   | Dec. 11, 2018    |
| Pre-Amplifier<br>EMCI                               | EMC12630SE  | 980385                        | Jan. 29, 2018   | Jan. 28, 2019    |
| RF Cable  | EMC104-SM-SM-1200<br>EMC104-SM-SM-2000<br>EMC104-SM-SM-5000 | 160923<br>150318<br>150321    | Jan. 29, 2018   | Jan. 28, 2019    |
| Pre-Amplifier<br>EMCI                               | EMC184045SE   | 980387                        | Jan. 29, 2018   | Jan. 28, 2019    |
| Horn_Antenna<br>SCHWARZBECK                         | BBHA 9170   | BBHA9170608                   | Dec. 14, 2017   | Dec. 13, 2018    |
| RF Cable  | EMC102-KM-KM-1200   | 160925                        | Jan. 29, 2018   | Jan. 28, 2019    |
| Software  | ADT_Radiated_V8.7.08  | NA                            | NA              | NA               |
| Boresight Antenna Tower &<br>Turn Table<br>Max-Full | MF-7802BS   | MF780208530                   | 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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 4.
4. The CANADA Site Registration No. is 20331-2
5. Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: June 27 to 28, 2018



#### 4.1.3 Test Procedures

##### **For Radiated emission below 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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 9kHz at frequency below 30MHz.

##### **For Radiated emission above 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

##### **Note:**

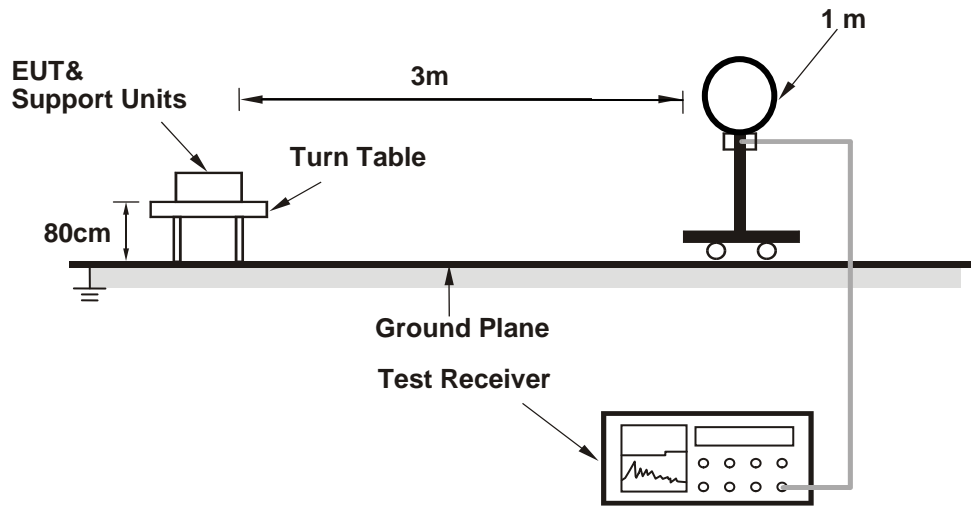
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

#### 4.1.4 Deviation from Test Standard

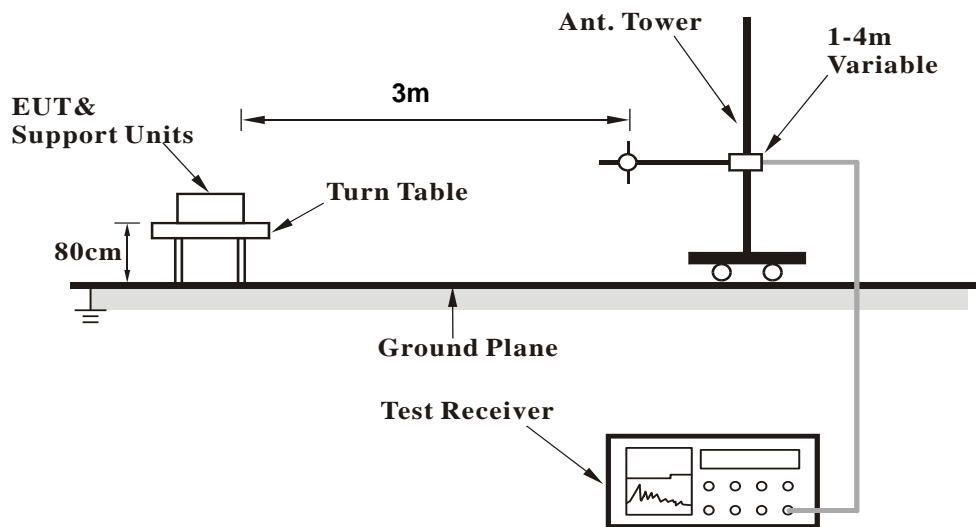
No deviation.

#### 4.1.5 Test Setup

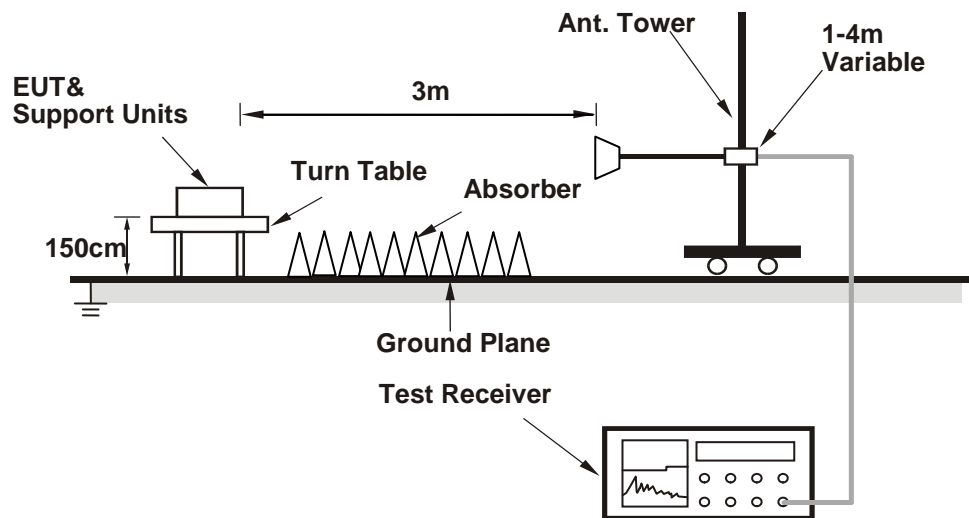
##### For Radiated emission below 30MHz



##### For Radiated emission 30MHz to 1GHz



### For Radiated emission above 1GHz



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

#### 4.1.6 EUT Operating Conditions

- a. Connected the EUT with the Laptop Computer which is placed on remote site.
- b. Controlling software (DUT labtool (1.0.0.109)) has been activated to set the EUT on specific status.

## 4.1.7 Test Results

## Above 1GHz Data:

## BT\_GFSK

|                        |              |                              |              |
|------------------------|--------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 0 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.   | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | 2390.00        | 53.3 PK                       | 74.0              | -20.7          | 2.11 H                   | 64                         | 55.5                   | -2.2                           |
| 2   | 2390.00        | 23.2 AV                       | 54.0              | -30.8          | 2.11 H                   | 64                         | 25.4                   | -2.2                           |
| 3   | *2402.00       | 92.8 PK                       |                   |                | 2.11 H                   | 64                         | 95.1                   | -2.3                           |
| 4   | *2402.00       | 62.7 AV                       |                   |                | 2.11 H                   | 64                         | 65.0                   | -2.3                           |
| 5   | 4804.00        | 40.6 PK                       | 74.0              | -33.4          | 2.50 H                   | 95                         | 38.8                   | 1.8                            |
| 6   | 4804.00        | 10.5 AV                       | 54.0              | -43.5          | 2.50 H                   | 95                         | 8.7                    | 1.8                            |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.   | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | 2390.00        | 52.6 PK                       | 74.0              | -21.4          | 3.08 V                   | 266                        | 54.8                   | -2.2                           |
| 2   | 2390.00        | 39.6 AV                       | 54.0              | -14.4          | 3.08 V                   | 266                        | 41.8                   | -2.2                           |
| 3   | *2402.00       | 99.8 PK                       |                   |                | 3.02 V                   | 277                        | 102.1                  | -2.3                           |
| 4   | *2402.00       | 69.7 AV                       |                   |                | 3.02 V                   | 277                        | 72.0                   | -2.3                           |
| 5   | 4804.00        | 40.4 PK                       | 74.0              | -33.6          | 1.82 V                   | 196                        | 38.6                   | 1.8                            |
| 6   | 4804.00        | 10.3 AV                       | 54.0              | -43.7          | 1.82 V                   | 196                        | 8.5                    | 1.8                            |

## REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " \* ": Fundamental frequency.
- The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 \* 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to:  $20\log(3.125 / 100) = -30.1$  dB
- The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle)

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 39 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz  |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.   | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | *2441.00       | 93.0 PK                       |                   |                | 2.13 H                   | 71                         | 95.6                   | -2.6                           |
| 2   | *2441.00       | 62.9 AV                       |                   |                | 2.13 H                   | 71                         | 65.5                   | -2.6                           |
| 3   | 4882.00        | 40.1 PK                       | 74.0              | -33.9          | 2.43 H                   | 87                         | 38.1                   | 2.0                            |
| 4   | 4882.00        | 10.0 AV                       | 54.0              | -44.0          | 2.43 H                   | 87                         | 8.0                    | 2.0                            |
| 5   | 7323.00        | 45.9 PK                       | 74.0              | -28.1          | 1.70 H                   | 300                        | 37.5                   | 8.4                            |
| 6   | 7323.00        | 15.8 AV                       | 54.0              | -38.2          | 1.70 H                   | 300                        | 7.4                    | 8.4                            |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.   | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | *2441.00       | 99.6 PK                       |                   |                | 2.97 V                   | 281                        | 102.2                  | -2.6                           |
| 2   | *2441.00       | 69.5 AV                       |                   |                | 2.97 V                   | 281                        | 72.1                   | -2.6                           |
| 3   | 4882.00        | 40.0 PK                       | 74.0              | -34.0          | 1.85 V                   | 181                        | 38.0                   | 2.0                            |
| 4   | 4882.00        | 9.9 AV                        | 54.0              | -44.1          | 1.85 V                   | 181                        | 7.9                    | 2.0                            |
| 5   | 7323.00        | 47.1 PK                       | 74.0              | -26.9          | 1.85 V                   | 212                        | 38.7                   | 8.4                            |
| 6   | 7323.00        | 17.0 AV                       | 54.0              | -37.0          | 1.85 V                   | 212                        | 8.6                    | 8.4                            |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on  $0.625 * 5$  per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to:  $20\log(3.125 / 100) = -30.1$  dB
7. The average value of fundamental and harmonic frequency is: Average = Peak value +  $20 \log(\text{Duty cycle})$

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 78 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz  |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.   | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | *2480.00       | 92.7 PK                       |                   |                | 2.07 H                   | 73                         | 95.3                   | -2.6                           |
| 2   | *2480.00       | 62.6 AV                       |                   |                | 2.07 H                   | 73                         | 65.2                   | -2.6                           |
| 3   | 2483.50        | 53.6 PK                       | 74.0              | -20.4          | 2.07 H                   | 73                         | 56.0                   | -2.4                           |
| 4   | 2483.50        | 23.5 AV                       | 54.0              | -30.5          | 2.07 H                   | 73                         | 25.9                   | -2.4                           |
| 5   | 4960.00        | 41.1 PK                       | 74.0              | -32.9          | 2.45 H                   | 90                         | 39.0                   | 2.1                            |
| 6   | 4960.00        | 11.0 AV                       | 54.0              | -43.0          | 2.45 H                   | 90                         | 8.9                    | 2.1                            |
| 7   | 7440.00        | 46.4 PK                       | 74.0              | -27.6          | 1.68 H                   | 292                        | 37.6                   | 8.8                            |
| 8   | 7440.00        | 16.3 AV                       | 54.0              | -37.7          | 1.68 H                   | 292                        | 7.5                    | 8.8                            |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.   | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | *2480.00       | 99.9 PK                       |                   |                | 3.05 V                   | 269                        | 102.5                  | -2.6                           |
| 2   | *2480.00       | 69.8 AV                       |                   |                | 3.05 V                   | 269                        | 72.4                   | -2.6                           |
| 3   | 2483.50        | 52.6 PK                       | 74.0              | -21.4          | 3.05 V                   | 269                        | 55.0                   | -2.4                           |
| 4   | 2483.50        | 22.5 AV                       | 54.0              | -31.5          | 3.05 V                   | 269                        | 24.9                   | -2.4                           |
| 5   | 4960.00        | 40.3 PK                       | 74.0              | -33.7          | 1.80 V                   | 182                        | 38.2                   | 2.1                            |
| 6   | 4960.00        | 10.2 AV                       | 54.0              | -43.8          | 1.80 V                   | 182                        | 8.1                    | 2.1                            |
| 7   | 7440.00        | 46.5 PK                       | 74.0              | -27.5          | 1.90 V                   | 217                        | 37.7                   | 8.8                            |
| 8   | 7440.00        | 16.4 AV                       | 54.0              | -37.6          | 1.90 V                   | 217                        | 7.6                    | 8.8                            |

**REMARKS:**

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " \* ": Fundamental frequency.
- The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 \* 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to:  $20\log(3.125 / 100) = -30.1$  dB
- The average value of fundamental and harmonic frequency is: Average = Peak value +  $20 \log(\text{Duty cycle})$

**BT\_8DPSK**

|                        |              |                              |              |
|------------------------|--------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 0 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.   | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | 2390.00        | 53.0 PK                       | 74.0              | -21.0          | 2.06 H                   | 52                         | 55.2                   | -2.2                           |
| 2   | 2390.00        | 22.9 AV                       | 54.0              | -31.1          | 2.06 H                   | 52                         | 25.1                   | -2.2                           |
| 3   | *2402.00       | 92.8 PK                       |                   |                | 2.06 H                   | 52                         | 95.1                   | -2.3                           |
| 4   | *2402.00       | 62.7 AV                       |                   |                | 2.06 H                   | 52                         | 65.0                   | -2.3                           |
| 5   | 4804.00        | 40.9 PK                       | 74.0              | -33.1          | 2.47 H                   | 73                         | 39.1                   | 1.8                            |
| 6   | 4804.00        | 10.8 AV                       | 54.0              | -43.2          | 2.47 H                   | 73                         | 9.0                    | 1.8                            |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.   | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | 2390.00        | 52.7 PK                       | 74.0              | -21.3          | 3.01 V                   | 282                        | 54.9                   | -2.2                           |
| 2   | 2390.00        | 39.6 AV                       | 54.0              | -14.4          | 3.01 V                   | 282                        | 41.8                   | -2.2                           |
| 3   | *2402.00       | 99.9 PK                       |                   |                | 3.01 V                   | 282                        | 102.2                  | -2.3                           |
| 4   | *2402.00       | 69.8 AV                       |                   |                | 3.01 V                   | 282                        | 72.1                   | -2.3                           |
| 5   | 4804.00        | 40.7 PK                       | 74.0              | -33.3          | 1.88 V                   | 187                        | 38.9                   | 1.8                            |
| 6   | 4804.00        | 10.6 AV                       | 54.0              | -43.4          | 1.88 V                   | 187                        | 8.8                    | 1.8                            |

**REMARKS:**

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " \* ": Fundamental frequency.
- The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 \* 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to:  $20\log(3.125 / 100) = -30.1$  dB
- The average value of fundamental and harmonic frequency is: Average = Peak value +  $20\log(\text{Duty cycle})$

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 39 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz  |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.   | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | *2441.00       | 92.9 PK                       |                   |                | 2.13 H                   | 53                         | 95.5                   | -2.6                           |
| 2   | *2441.00       | 62.8 AV                       |                   |                | 2.13 H                   | 53                         | 65.4                   | -2.6                           |
| 3   | 4882.00        | 40.6 PK                       | 74.0              | -33.4          | 2.44 H                   | 92                         | 38.6                   | 2.0                            |
| 4   | 4882.00        | 10.5 AV                       | 54.0              | -43.5          | 2.44 H                   | 92                         | 8.5                    | 2.0                            |
| 5   | 7323.00        | 46.8 PK                       | 74.0              | -27.2          | 1.70 H                   | 300                        | 38.4                   | 8.4                            |
| 6   | 7323.00        | 16.7 AV                       | 54.0              | -37.3          | 1.70 H                   | 300                        | 8.3                    | 8.4                            |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.   | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | *2441.00       | 99.6 PK                       |                   |                | 3.01 V                   | 274                        | 102.2                  | -2.6                           |
| 2   | *2441.00       | 69.5 AV                       |                   |                | 3.01 V                   | 274                        | 72.1                   | -2.6                           |
| 3   | 4882.00        | 40.0 PK                       | 74.0              | -34.0          | 1.87 V                   | 200                        | 38.0                   | 2.0                            |
| 4   | 4882.00        | 9.9 AV                        | 54.0              | -44.1          | 1.87 V                   | 200                        | 7.9                    | 2.0                            |
| 5   | 7323.00        | 46.2 PK                       | 74.0              | -27.8          | 1.83 V                   | 218                        | 37.8                   | 8.4                            |
| 6   | 7323.00        | 16.1 AV                       | 54.0              | -37.9          | 1.83 V                   | 218                        | 7.7                    | 8.4                            |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on  $0.625 * 5$  per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to:  $20\log(3.125 / 100) = -30.1$  dB
7. The average value of fundamental and harmonic frequency is: Average = Peak value +  $20 \log(\text{Duty cycle})$



|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 78 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz  |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.   | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | *2480.00       | 93.1 PK                       |                   |                | 2.08 H                   | 67                         | 95.7                   | -2.6                           |
| 2   | *2480.00       | 63.0 AV                       |                   |                | 2.08 H                   | 67                         | 65.6                   | -2.6                           |
| 3   | 2483.50        | 53.1 PK                       | 74.0              | -20.9          | 2.08 H                   | 67                         | 55.5                   | -2.4                           |
| 4   | 2483.50        | 23.0 AV                       | 54.0              | -31.0          | 2.08 H                   | 67                         | 25.4                   | -2.4                           |
| 5   | 4960.00        | 40.7 PK                       | 74.0              | -33.3          | 2.46 H                   | 93                         | 38.6                   | 2.1                            |
| 6   | 4960.00        | 10.6 AV                       | 54.0              | -43.4          | 2.46 H                   | 93                         | 8.5                    | 2.1                            |
| 7   | 7440.00        | 46.8 PK                       | 74.0              | -27.2          | 1.78 H                   | 304                        | 38.0                   | 8.8                            |
| 8   | 7440.00        | 16.7 AV                       | 54.0              | -37.3          | 1.78 H                   | 304                        | 7.9                    | 8.8                            |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.   | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | *2480.00       | 100.3 PK                      |                   |                | 3.00 V                   | 282                        | 102.9                  | -2.6                           |
| 2   | *2480.00       | 70.2 AV                       |                   |                | 3.00 V                   | 282                        | 72.8                   | -2.6                           |
| 3   | 2483.50        | 53.2 PK                       | 74.0              | -20.8          | 3.00 V                   | 282                        | 55.6                   | -2.4                           |
| 4   | 2483.50        | 23.1 AV                       | 54.0              | -30.9          | 3.00 V                   | 282                        | 25.5                   | -2.4                           |
| 5   | 4960.00        | 40.5 PK                       | 74.0              | -33.5          | 1.85 V                   | 185                        | 38.4                   | 2.1                            |
| 6   | 4960.00        | 10.4 AV                       | 54.0              | -43.6          | 1.85 V                   | 185                        | 8.3                    | 2.1                            |
| 7   | 7440.00        | 46.7 PK                       | 74.0              | -27.3          | 1.85 V                   | 227                        | 37.9                   | 8.8                            |
| 8   | 7440.00        | 16.6 AV                       | 54.0              | -37.4          | 1.85 V                   | 227                        | 7.8                    | 8.8                            |

**REMARKS:**

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " \* ": Fundamental frequency.
- The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 \* 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to:  $20\log(3.125 / 100) = -30.1$  dB
- The average value of fundamental and harmonic frequency is: Average = Peak value +  $20 \log(\text{Duty cycle})$

**Below 1GHz Data:**

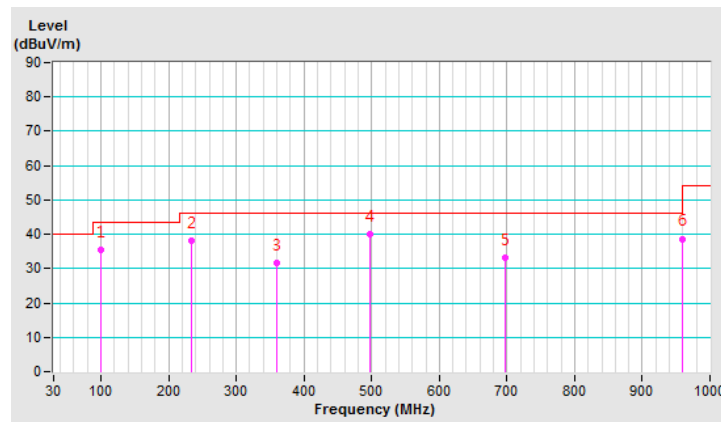
**BT\_8DPSK**

|                        |              |                          |                 |
|------------------------|--------------|--------------------------|-----------------|
| <b>CHANNEL</b>         | TX Channel 0 | <b>DETECTOR FUNCTION</b> | Quasi-Peak (QP) |
| <b>FREQUENCY RANGE</b> | 9kHz ~ 1GHz  |                          |                 |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | 99.94       | 35.4 QP                 | 43.5           | -8.1        | 1.50 H             | 179                  | 52.7             | -17.3                    |
| 2   | 233.22      | 38.1 QP                 | 46.0           | -7.9        | 1.00 H             | 241                  | 53.1             | -15.0                    |
| 3   | 359.63      | 31.8 QP                 | 46.0           | -14.2       | 1.00 H             | 360                  | 42.3             | -10.5                    |
| 4   | 498.13      | 40.0 QP                 | 46.0           | -6.0        | 1.00 H             | 15                   | 46.9             | -6.9                     |
| 5   | 696.69      | 33.1 QP                 | 46.0           | -12.9       | 2.00 H             | 299                  | 36.3             | -3.2                     |
| 6   | 959.81      | 38.7 QP                 | 46.0           | -7.3        | 1.00 H             | 74                   | 37.6             | 1.1                      |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.



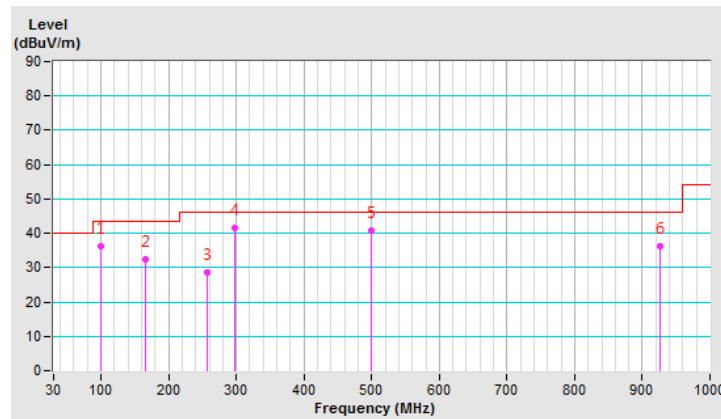
|                        |              |                          |                 |
|------------------------|--------------|--------------------------|-----------------|
| <b>CHANNEL</b>         | TX Channel 0 | <b>DETECTOR FUNCTION</b> | Quasi-Peak (QP) |
| <b>FREQUENCY RANGE</b> | 9kHz ~ 1GHz  |                          |                 |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

| NO.      | FREQ. (MHz)   | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|----------|---------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1        | 100.02        | 36.3 QP                 | 43.5           | -7.2        | 1.50 V             | 221                  | 53.6             | -17.3                    |
| 2        | 166.58        | 32.4 QP                 | 43.5           | -11.1       | 1.00 V             | 100                  | 45.4             | -13.0                    |
| 3        | 256.41        | 28.5 QP                 | 46.0           | -17.5       | 1.00 V             | 296                  | 42.2             | -13.7                    |
| <b>4</b> | <b>298.66</b> | <b>41.6 QP</b>          | <b>46.0</b>    | <b>-4.4</b> | <b>1.50 V</b>      | <b>117</b>           | <b>53.8</b>      | <b>-12.2</b>             |
| 5        | 499.68        | 40.7 QP                 | 46.0           | -5.3        | 1.00 V             | 81                   | 47.6             | -6.9                     |
| 6        | 926.12        | 36.3 QP                 | 46.0           | -9.7        | 1.00 V             | 160                  | 35.4             | 0.9                      |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.

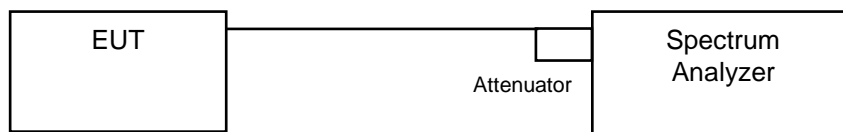


## 4.2 Maximum Output Power

### 4.2.1 Limits of Maximum Output Power Measurement

The Maximum Output Power Measurement is 125mW.

### 4.2.2 Test Setup



### 4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.2.4 Test Procedure

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. 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.
- c. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3MHz RBW and 10 MHz VBW.
- d. Measure the captured power within the band and recording the plot.
- e. Repeat above procedures until all frequencies required were complete.

### 4.2.5 Deviation from Test Standard

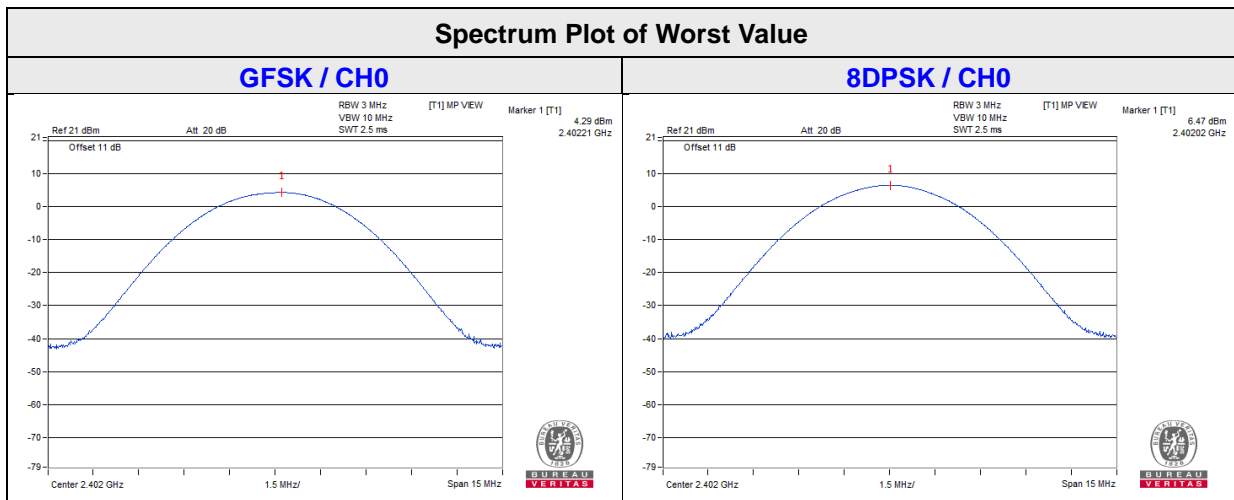
No deviation.

### 4.2.6 EUT Operating Condition

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

#### 4.2.7 Test Results

| Channel | Frequency (MHZ) | Output Power (mW) |       | Output Power (dBm) |       | Power Limit (mW) | Pass / Fail |
|---------|-----------------|-------------------|-------|--------------------|-------|------------------|-------------|
|         |                 | GFSK              | 8DPSK | GFSK               | 8DPSK |                  |             |
| 0       | 2402            | 2.685             | 4.436 | 4.29               | 6.47  | 125              | Pass        |
| 39      | 2441            | 2.594             | 4.055 | 4.14               | 6.08  | 125              | Pass        |
| 78      | 2480            | 2.559             | 3.954 | 4.08               | 5.97  | 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 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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