



# FCC TEST REPORT (BLUETOOTH/DTS)

**REPORT NO.:** RF140212E04J-1

**MODEL NO.:** AR5B22-SB

**FCC ID:** PPD-AR5B22SB

**IC:** 4104A-AR5B22SB

**RECEIVED:** Oct. 24, 2014

**TESTED:** Oct. 24 to Nov. 14, 2014

**ISSUED:** Nov. 19, 2014

**APPLICANT:** Qualcomm Atheros, Inc.

**ADDRESS:** 1700 Technology Drive, San Jose, CA 95110

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

**LAB ADDRESS:** No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

**TEST LOCATION (1):** No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, Taiwan, R.O.C.

**TEST LOCATION (2):** No.49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, Taiwan, R.O.C.

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## RELEASE CONTROL RECORD

| ISSUE NO.      | REASON FOR CHANGE | DATE ISSUED   |
|----------------|-------------------|---------------|
| RF140212E04J-1 | Original release  | Nov. 19, 2014 |



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# 1 CERTIFICATION

**PRODUCT :** PCIE 802.11b/g/n 2.4GHz + USB BT 4.0 card  
**BRAND NAME :** Atheros  
**MODEL NO. :** AR5B22-SB  
**TEST SAMPLE :** R&D SAMPLE  
**APPLICANT :** Qualcomm Atheros, Inc.  
**TESTED :** Oct. 24 to Nov. 14, 2014  
**STANDARDS :** FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.10-2009  
Canada RSS-210 Issue 8 (2010-12)  
Canada RSS-Gen Issue 3 (2010-12)

The above equipment (Model: AR5B22-SB) 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 :**  , **Date:** Nov. 19, 2014  
( Lori Chung, Specialist )

**Approved By :**  , **Date:** Nov. 19, 2014  
( May Chen, Manager )



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## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

### For BT-EDR mode:

| APPLIED STANDARD: FCC Part 15, Subpart C; RSS-210; RSS-Gen |                    |                                |        |  |
|--|--------------------|--------------------------------|--------|--|
| STANDARD SECTION   |                    | TEST TYPE AND LIMIT            | RESULT | REMARK   |
| FCC Part 15  | RSS-Gen<br>RSS-210 |                                |        |  |
| 15.247(b)  | RSS-210<br>A8.4(2) | Maximum Peak Output Power      | PASS   | Meet the requirement of limit.   |
| 15.247(d)  | RSS-210<br>A8.5    | Transmitter Radiated Emissions | PASS   | Meet the requirement of limit.<br>Minimum passing margin is -3.2dB at 851.35MHz. |

### For BT-LE mode:

| APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247) ; RSS-210; RSS-Gen |                     |  |        |   |
|--|---------------------|--|--------|---|
| STANDARD SECTION   |                     | TEST TYPE                                  | RESULT | REMARK  |
| FCC Part 15  | RSS-Gen             |  |        |   |
| 15.247(d)<br>15.209  | RSS-210<br>A8.5     | Radiated Emissions & Band Edge Measurement | PASS   | Meet the requirement of limit.<br>Minimum passing margin is -3.0dB at 760.07MHz |
| 15.247(b)  | RSS-210<br>A8.2 (4) | Conducted power                            | PASS   | Meet the requirement of limit.  |

## 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:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

| Measurement                       | Value   |
|-----------------------------------|---------|
| Radiated emissions (30MHz-1GHz)   | 5.37 dB |
| Radiated emissions (1GHz -6GHz)   | 3.65 dB |
| Radiated emissions (6GHz -18GHz)  | 3.88 dB |
| Radiated emissions (18GHz -40GHz) | 4.11 dB |



### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT(BLUETOOTH/DTS)

|                              |  |
|------------------------------|--|
| <b>PRODUCT</b>               | PCIE 802.11b/g/n 2.4GHz + USB BT 4.0 card  |
| <b>MODEL NO.</b>             | AR5B22-SB  |
| <b>POWER SUPPLY</b>          | 3.3Vdc from host equipment   |
| <b>MODULATION TYPE</b>       | GFSK, $\pi/4$ -DQPSK, 8DPSK for FHSS<br>16QAM, QPSK, BPSK for OFDM<br>GFSK for DTS       |
| <b>MODULATION TECHNOLOGY</b> | FHSS, OFDM, DTS  |
| <b>DATE RATE</b>             | Up to 3Mbps for BT-EDR mode<br>Up to 24Mbps for BT-HS mode<br>Up to 1Mbps for BT-LE mode |
| <b>FREQUENCY RANGE</b>       | BT-EDR, BT-LE mode: 2402MHz ~ 2480MHz<br>BT-HS mode: 2412MHz ~ 2462MHz                   |
| <b>NUMBER OF CHANNEL</b>     | BT-EDR mode: 79<br>BT-HS mode: 11<br>BT-LE mode: 40                                      |
| <b>MAX. OUTPUT POWER</b>     | BT-EDR mode: 4.613mW<br>BT-LE mode: 2.393mW  |
| <b>ANTENNA TYPE</b>          | See item 3.2   |
| <b>DATA CABLE</b>            | NA   |
| <b>I/O PORTS</b>             | NA   |
| <b>ASSOCIATED DEVICES</b>    | NA   |





**NOTE:**

1. This report is prepared for FCC Class II change. The difference compared with the Report No.: RF110907E02A-1 R1 design is as the following:

- ◆ Miner Layout change.
- ◆ Schematic change for digital part.
- ◆ Add 1 new antenna (No. 3) as following table:

| Original |       |                  |              |           |   |                |                  |
|----------|-------|------------------|--------------|-----------|---|----------------|------------------|
| No.      | Brand | Model            | Antenna Type | Connector | Antenna Gain (dBi)<br><included cable loss> | Cable Loss(dB) | Cable Length(mm) |
| 1&2      | WNC   | 81.EBJ15.005     | PIFA         | IPEX      | 3.62  | 1.15           | 300              |
| Newly    |       |                  |              |           |   |                |                  |
| No.      | Brand | Model            | Antenna Type | Connector | Antenna Gain (dBi)<br><included cable loss> | Cable Loss(dB) | Cable Length(mm) |
| 3        | INPAQ | WA-F-LBLB-04-028 | PIFA         | IPEX      | 2.38 (Main)<br>2.30 (Aux)                   | -0.47          | 143              |

2. According to above conditions, only radiated emission / conducted output power need to be performed. And all data was verified to meet the requirements.
3. The device has three configurations (working mode)
- a. WLAN only (2x2 MIMO)
  - b. BT+WLAN (2x2 MIMO) with reduced power on WLAN
  - c. BT+WLAN (1x1 mode on b/g only, chain 0 is used for BT and chain 1 is used for WLAN)
4. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

### 3.2 DESCRIPTION OF ANTENNA

The antennas provided to this EUT, please refer to the following table:

| No. | Brand | Model            | Antenna Type | Connector | Antenna Gain (dBi)<br><included cable loss> | Cable Loss(dB) | Cable Length(mm) |
|-----|-------|------------------|--------------|-----------|---|----------------|------------------|
| 1&2 | WNC   | 81.EBJ15.005     | PIFA         | IPEX      | 3.62  | 1.15           | 300              |
| 3   | INPAQ | WA-F-LBLB-04-028 | PIFA         | IPEX      | 2.38 (Main)<br>2.30 (Aux)                   | -0.47          | 143              |

Note: Above antenna gains of antenna are Total (H+V).



### 3.3 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        |         |             |

40 channels are provided for BT-LE mode:

| CHANNEL | FREQ. (MHZ) | CHANNEL | FREQ. (MHZ) | CHANNEL | FREQ. (MHZ) | CHANNEL | FREQ. (MHZ) |
|---------|-------------|---------|-------------|---------|-------------|---------|-------------|
| 0       | 2402        | 10      | 2422        | 20      | 2442        | 30      | 2462        |
| 1       | 2404        | 11      | 2424        | 21      | 2444        | 31      | 2464        |
| 2       | 2406        | 12      | 2426        | 22      | 2446        | 32      | 2466        |
| 3       | 2408        | 13      | 2428        | 23      | 2448        | 33      | 2468        |
| 4       | 2410        | 14      | 2430        | 24      | 2450        | 34      | 2470        |
| 5       | 2412        | 15      | 2432        | 25      | 2452        | 35      | 2472        |
| 6       | 2414        | 16      | 2434        | 26      | 2454        | 36      | 2474        |
| 7       | 2416        | 17      | 2436        | 27      | 2456        | 37      | 2476        |
| 8       | 2418        | 18      | 2438        | 28      | 2458        | 38      | 2478        |
| 9       | 2420        | 19      | 2440        | 29      | 2460        | 39      | 2480        |



### 3.4 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

For BT-EDR mode:

| EUT CONFIGURE MODE | APPLICABLE TO |         |      | DESCRIPTION |
|--------------------|---------------|---------|------|-------------|
|                    | RE < 1G       | RE ≥ 1G | APCM |             |
| -                  | √             | √       | √    | -           |

Where RE < 1G: Radiated Emission below 1GHz RE ≥ 1G: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

Note In original report, the EUT's antenna had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on X-plane.

#### 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.

| Available Channel | Tested Channel | Modulation Type | Packet Type |
|-------------------|----------------|-----------------|-------------|
| 0 to 78           | 78             | GFSK            | DH5         |

#### 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.

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

#### Antenna Port Conducted Measurement:

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 Type | Packet Type |
|-------------------|----------------|-----------------|-------------|
| 0 to 78           | 0, 39, 78      | GFSK            | DH5         |
| 0 to 78           | 0, 39, 78      | 8DPSK           | 3DH5        |

#### TEST CONDITION:

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER (SYSTEM) | TESTED BY    |
|---------------|--------------------------|----------------------|--------------|
| RE<1G         | 26deg. C, 68%RH          | 120Vac, 60Hz         | Robert Cheng |
| RE≥1G         | 23deg. C, 68%RH          | 120Vac, 60Hz         | Tim Ho       |
| APCM          | 25deg. C, 60%RH          | 120Vac, 60Hz         | Robert Cheng |

**For BT-LE mode:**

| EUT CONFIGURE MODE | APPLICABLE TO |         |      | DESCRIPTION |
|--------------------|---------------|---------|------|-------------|
|                    | RE < 1G       | RE ≥ 1G | APCM |             |
| -                  | √             | √       | √    | -           |

Where **RE < 1G**: Radiated Emission below 1GHz      **RE ≥ 1G**: Radiated Emission above 1GHz

**APCM**: Antenna Port Conducted Measurement

Note In original report, the EUT's antenna had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

**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.

| MODE  | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE | DATA RATE (Mbps) |
|-------|-------------------|----------------|-----------------|------------------|
| BT-LE | 0 to 39           | 19             | GFSK            | 1                |

**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.

| MODE  | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE | DATA RATE (Mbps) |
|-------|-------------------|----------------|-----------------|------------------|
| BT-LE | 0 to 39           | 0, 19, 39      | GFSK            | 1                |

**ANTENNA PORT CONDUCTED MEASUREMENT:**

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.

| MODE  | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE | DATA RATE (Mbps) |
|-------|-------------------|----------------|-----------------|------------------|
| BT-LE | 0 to 39           | 0, 19, 39      | GFSK            | 1                |



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**TEST CONDITION:**

| <b>APPLICABLE TO</b> | <b>ENVIRONMENTAL CONDITIONS</b> | <b>INPUT POWER (SYSTEM)</b> | <b>TESTED BY</b> |
|----------------------|---------------------------------|-----------------------------|------------------|
| <b>RE&lt;1G</b>      | 26deg. C, 68%RH                 | 120Vac, 60Hz                | Robert Cheng     |
| <b>RE≥1G</b>         | 23deg. C, 68%RH                 | 120Vac, 60Hz                | Tim Ho           |
| <b>APCM</b>          | 25deg. C, 60%RH                 | 120Vac, 60Hz                | James Chan       |



### **3.5 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 (Section 15.247)**

**558074 D01 DTS Meas Guidance v03r02**

**ANSI C63.10-2009**

**Canada RSS-210 Issue 8 (2010-12)**

**Canada RSS-Gen Issue 3 (2010-12)**

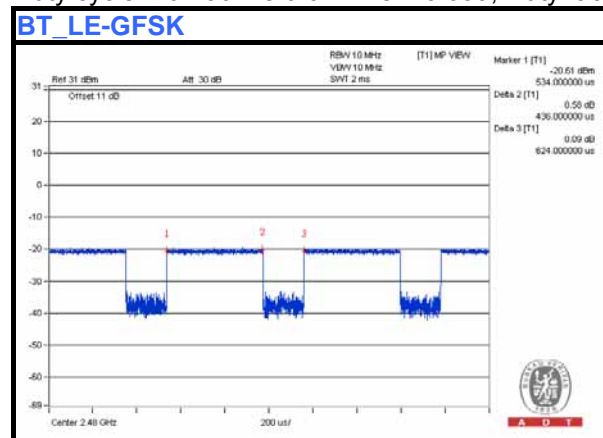
All test items have been performed and recorded as per the above standards.

### 3.6 DUTY CYCLE OF TEST SIGNAL

If duty cycle of test signal is < 98%, duty factor shall be considered.

For **BT\_LE-GFSK**:

Duty cycle = 0.436 ms/0.624 ms = 0.699, Duty factor =  $10 * \log(1/0.699) = 1.6$





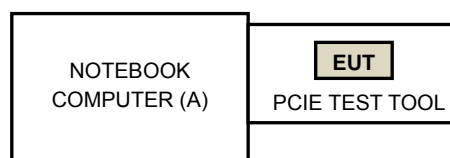


### 3.7 DESCRIPTION OF SUPPORT UNITS

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  | Remark             |
|-----|-------------------|-----------|-----------|------------|---------|--------------------|
| A   | PERSONAL COMPUTER | DELL      | E5430     | GM1SKV1    | FCC DoC | Provided by Lab    |
| B   | PCIE TEST TOOL    | AzureWave | NA        | NA         | NA      | Supplied by client |

### 3.8 CONFIGURATION OF SYSTEM UNDER TEST



## 4 TEST PROCEDURES AND RESULTS(BT-EDR)

### 4.1 MAXIMUM PEAK OUTPUT POWER

#### 4.1.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Limit is 125mW.

#### 4.1.2 INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| SPECTRUM ANALYZER R&S      | FSV 40    | 100060     | May 08, 2014    | May 07, 2015     |

**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. Tested date : Oct. 24, 2014

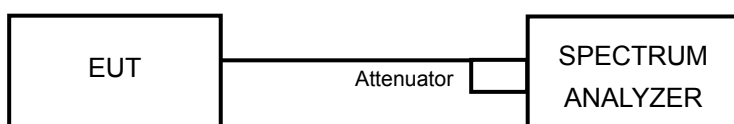
#### 4.1.3 TEST PROCEDURES

- 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.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 TEST SETUP



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

#### 4.1.6 EUT OPERATING CONDITION

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



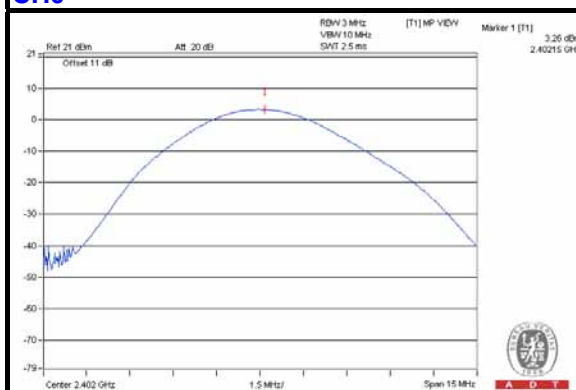
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### 4.1.7 TEST RESULTS

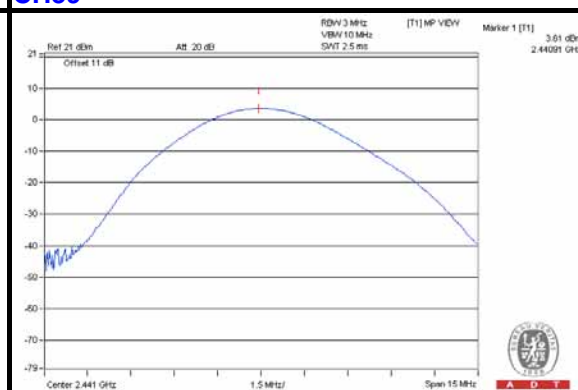
| CHANNEL | FREQUENCY (MHz) | OUTPUT POWER (mW) |       | OUTPUT POWER (dBm) |       | POWER LIMIT (mW) | PASS / FAIL |
|---------|-----------------|-------------------|-------|--------------------|-------|------------------|-------------|
|         |                 | GFSK              | 8DPSK | GFSK               | 8DPSK |                  |             |
| 0       | 2402            | 2.118             | 3.639 | 3.26               | 5.61  | 125              | PASS        |
| 39      | 2441            | 2.296             | 4.083 | 3.61               | 6.11  | 125              | PASS        |
| 78      | 2480            | 2.489             | 4.613 | 3.96               | 6.64  | 125              | PASS        |

#### For GFSK

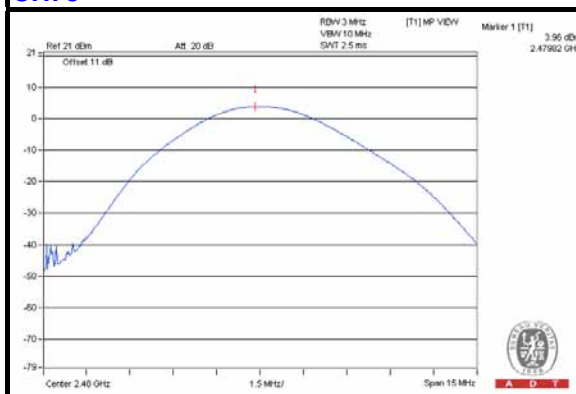
##### CH0



##### CH39



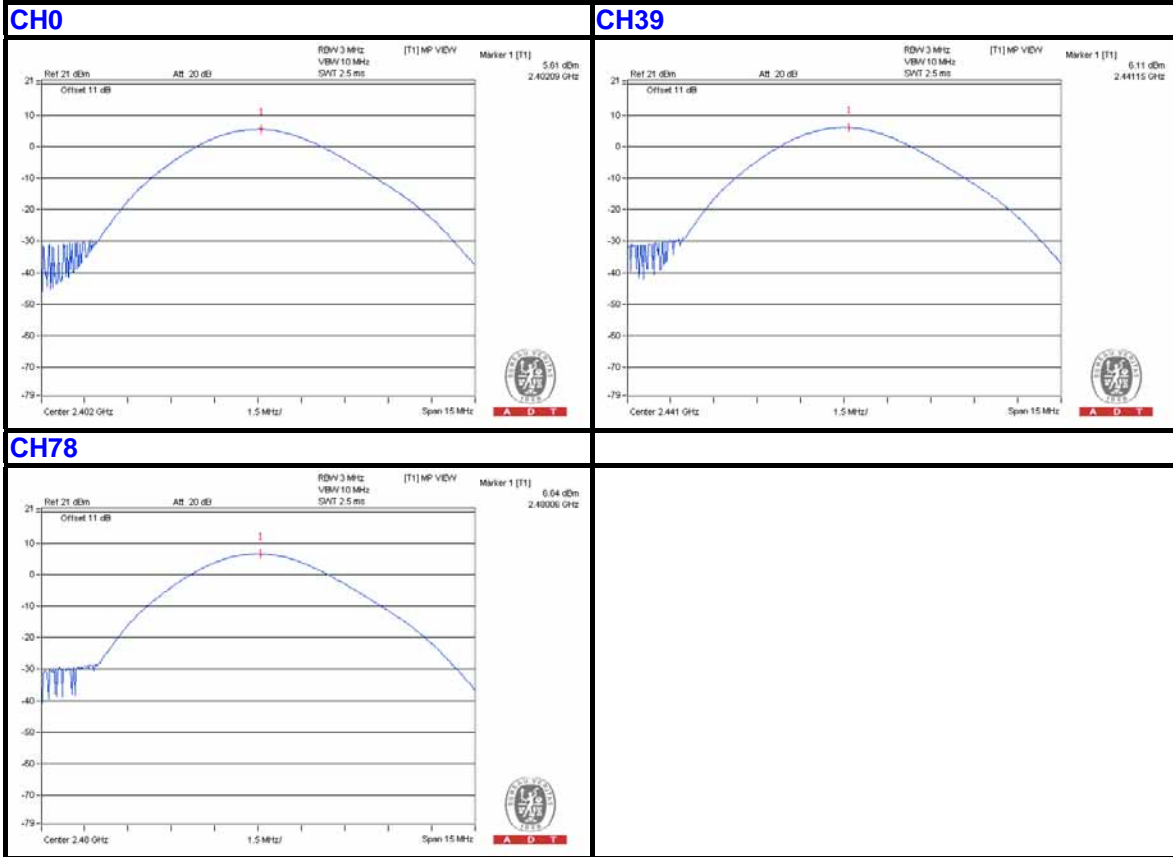
##### CH78





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### For 8DPSK



## 4.2 AVERAGE OUTPUT POWER

### 4.2.1 FOR REFERENCE.

### 4.2.2 INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| Power Meter<br>Anritsu     | ML2495A   | 1014008    | Apr. 30, 2014   | Apr. 29, 2015    |
| Power Sensor<br>Anritsu    | MA2411B   | 0917122    | Apr. 30, 2014   | Apr. 29, 2015    |

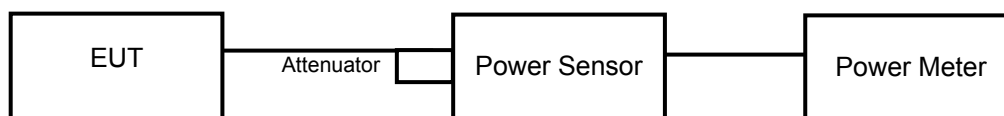
**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 24, 2014

### 4.2.3 TEST PROCEDURES

The average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power sensor. Record the peak power level.

### 4.2.4 TEST SETUP



### 4.2.5 EUT OPERATING CONDITION

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

#### 4.2.6 TEST RESULTS

| CHANNEL | FREQUENCY<br>(MHz) | AVERAGE POWER OUTPUT<br>(dBm) |       |
|---------|--------------------|-------------------------------|-------|
|         |                    | GFSK                          | 8DPSK |
| 0       | 2402               | 2.000                         | 2.004 |
| 39      | 2441               | 2.193                         | 2.223 |
| 78      | 2480               | 2.355                         | 2.460 |

### 4.3 RADIATED EMISSION MEASUREMENT

#### 4.3.1 LIMITS OF RADIATED EMISSION 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. As shown in 15.35(b), 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.





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### 4.3.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER              | MODEL NO.        | SERIAL NO.                      | CALIBRATED DATE | CALIBRATED UNTIL |
|---|------------------|---------------------------------|-----------------|------------------|
| MXE EMI Receiver<br>Agilent             | N9038A           | MY51210105                      | July 21, 2014   | July 20, 2015    |
| Pre-Amplifier<br>Mini-Circuits          | ZFL-1000VH2<br>B | AMP-ZFL-03                      | Nov. 13, 2013   | Nov. 12, 2014    |
| Trilog Broadband Antenna<br>SCHWARZBECK | VULB 9168        | 9168-360                        | Feb. 26, 2014   | Feb. 25, 2015    |
| RF Cable                                | NA               | CHGCAB_001                      | Oct. 04, 2014   | Oct. 03, 2015    |
| Horn_Antenna<br>AISI                    | AIH.8018         | 0000320091110                   | Aug. 27, 2014   | Aug. 26, 2015    |
| Pre-Amplifier<br>Agilent                | 8449B            | 3008A02578                      | June 24, 2014   | June 23, 2015    |
| RF Cable                                | NA               | 131205<br>131214<br>SNMY23684/4 | Jan. 17, 2014   | Jan. 16, 2015    |
| Spectrum Analyzer<br>R&S                | FSV40            | 100964                          | July 05, 2014   | July 04, 2015    |
| Pre-Amplifier<br>SPACEK LABS            | SLKKa-48-6       | 9K16                            | Nov. 13, 2013   | Nov. 12, 2014    |
| Horn_Antenna<br>SCHWARZBECK             | BBHA 9170        | 9170-424                        | Aug. 26, 2014   | Aug. 25, 2015    |
| RF Cable                                | NA               | RF104-121<br>RF104-204          | Dec. 12, 2013   | Dec. 11, 2014    |
| Antenna Tower & Turn Table<br>CT        | NA               | 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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.
7. Tested Date: Oct. 12 to 14, 2014

### 4.3.3 TEST PROCEDURES

- 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. 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:**

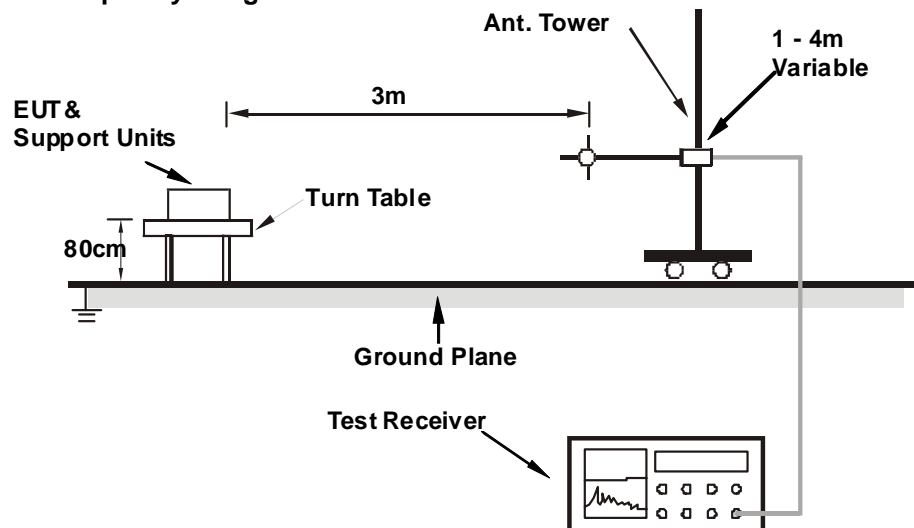
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 1MHz for Peak detection at frequency above 1GHz.
3. The resolution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

### 4.3.4 DEVIATION FROM TEST STANDARD

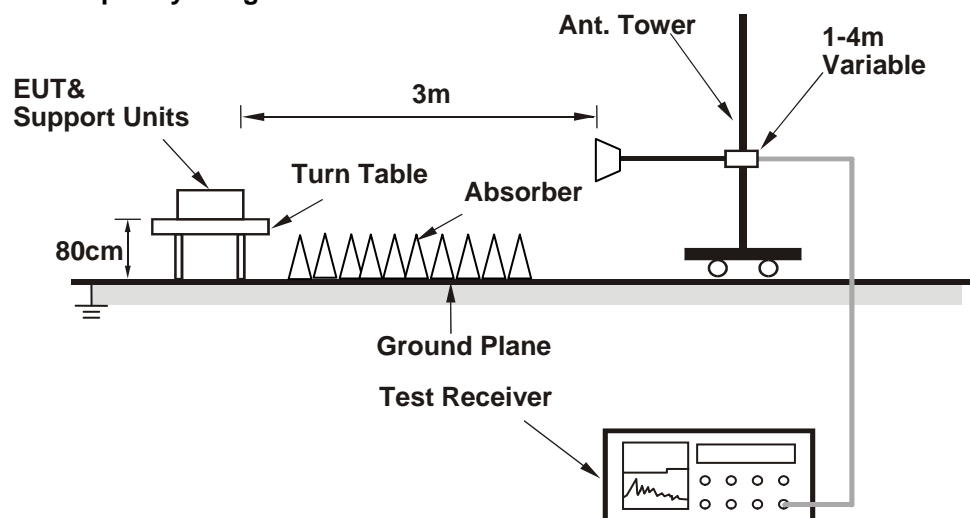
No deviation

### 4.3.5 TEST SETUP

#### <Frequency Range below 1GHz>



#### <Frequency Range above 1GHz>



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### 4.3.6 EUT OPERATING CONDITIONS

1. Connect the EUT with the support unit A (Notebook Computer) which is placed on a testing table.
2. The communication partner run test program “Artgui.exe” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

### 4.3.7 TEST RESULTS

#### BELOW 1GHz WORST-CASE DATA

#### BT\_GFSK

|                        |               |                          |                 |
|------------------------|---------------|--------------------------|-----------------|
| <b>CHANNEL</b>         | TX Channel 78 | <b>DETECTOR FUNCTION</b> | Quasi-Peak (QP) |
| <b>FREQUENCY RANGE</b> | 30MHz ~ 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   | 240.11        | 38.7 QP                 | 46.0           | -7.4        | 1.24 H             | 345                  | 53.55            | -14.90                   |
| 2   | 498.79        | 40.4 QP                 | 46.0           | -5.6        | 1.34 H             | 204                  | 47.78            | -7.36                    |
| 3   | 698.11        | 41.1 QP                 | 46.0           | -4.9        | 1.24 H             | 240                  | 44.47            | -3.36                    |
| 4   | 760.15        | 42.1 QP                 | 46.0           | -3.9        | 1.45 H             | 201                  | 43.65            | -1.54                    |
| 5   | <b>851.35</b> | <b>42.9 QP</b>          | <b>46.0</b>    | <b>-3.2</b> | <b>1.45 H</b>      | <b>201</b>           | <b>43.41</b>     | <b>-0.56</b>             |
| 6   | 961.54        | 40.1 QP                 | 54.0           | -13.9       | 1.45 H             | 201                  | 38.84            | 1.30                     |

#### 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   | 31.76       | 34.2 QP                 | 40.0           | -5.8        | 1.45 V             | 64                   | 48.87            | -14.67                   |
| 2   | 166.11      | 35.2 QP                 | 43.5           | -8.3        | 1.24 V             | 243                  | 48.91            | -13.67                   |
| 3   | 299.12      | 42.0 QP                 | 46.0           | -4.0        | 1.45 V             | 175                  | 54.53            | -12.52                   |
| 4   | 497.75      | 39.2 QP                 | 46.0           | -6.8        | 1.45 V             | 245                  | 46.59            | -7.35                    |
| 5   | 707.24      | 39.2 QP                 | 46.0           | -6.8        | 1.45 V             | 275                  | 42.51            | -3.27                    |
| 6   | 833.00      | 41.2 QP                 | 46.0           | -4.8        | 1.24 V             | 220                  | 41.93            | -0.69                    |

#### 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



ABOVE 1GHz DATA

BT\_GFSK

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

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   | 2320.00     | 49.1 PK                 | 74.0           | -24.9       | 1.25 H             | 102                  | 51.88            | -2.78                    |
| 2   | 2320.00     | 19.0 AV                 | 54.0           | -35.0       | 1.25 H             | 102                  | 21.78            | -2.78                    |
| 3   | *2402.00    | 98.0 PK                 |                |             | 1.25 H             | 102                  | 100.41           | -2.41                    |
| 4   | *2402.00    | 67.9 AV                 |                |             | 1.25 H             | 102                  | 70.31            | -2.41                    |
| 5   | 4804.00     | 45.8 PK                 | 74.0           | -28.2       | 1.02 H             | 138                  | 40.18            | 5.62                     |
| 6   | 4804.00     | 15.7 AV                 | 54.0           | -38.3       | 1.02 H             | 138                  | 10.08            | 5.62                     |

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   | 2320.00     | 48.6 PK                 | 74.0           | -25.4       | 1.31 V             | 247                  | 51.38            | -2.78                    |
| 2   | 2320.00     | 18.5 AV                 | 54.0           | -35.5       | 1.31 V             | 247                  | 21.28            | -2.78                    |
| 3   | *2402.00    | 95.5 PK                 |                |             | 1.31 V             | 247                  | 97.91            | -2.41                    |
| 4   | *2402.00    | 65.4 AV                 |                |             | 1.31 V             | 247                  | 67.81            | -2.41                    |
| 5   | 4804.00     | 48.1 PK                 | 74.0           | -25.9       | 1.05 V             | 168                  | 42.48            | 5.62                     |
| 6   | 4804.00     | 18.0 AV                 | 54.0           | -36.0       | 1.05 V             | 168                  | 12.38            | 5.62                     |

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:  $20\log(3.125 / 100) = -30.1 \text{ dB}$
7. Average value = peak reading +  $20\log(\text{duty cycle})$ .



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

**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   | *2441.00    | 101.1 PK                |                |             | 1.20 H             | 113                  | 103.34           | -2.24                    |
| 2   | *2441.00    | 71.0 AV                 |                |             | 1.20 H             | 113                  | 73.24            | -2.24                    |
| 3   | 4882.00     | 45.8 PK                 | 74.0           | -28.2       | 1.03 H             | 138                  | 39.86            | 5.94                     |
| 4   | 4882.00     | 15.7 AV                 | 54.0           | -38.3       | 1.03 H             | 138                  | 9.76             | 5.94                     |
| 5   | 7323.00     | 55.1 PK                 | 74.0           | -18.9       | 1.02 H             | 143                  | 41.92            | 13.18                    |
| 6   | 7323.00     | 25.0 AV                 | 54.0           | -29.0       | 1.02 H             | 143                  | 11.82            | 13.18                    |

**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   | *2441.00    | 98.8 PK                 |                |             | 1.37 V             | 248                  | 101.04           | -2.24                    |
| 2   | *2441.00    | 68.7 AV                 |                |             | 1.37 V             | 248                  | 70.94            | -2.24                    |
| 3   | 4882.00     | 47.5 PK                 | 74.0           | -26.5       | 1.05 V             | 165                  | 41.56            | 5.94                     |
| 4   | 4882.00     | 17.4 AV                 | 54.0           | -36.6       | 1.05 V             | 165                  | 11.46            | 5.94                     |
| 5   | 7323.00     | 53.9 PK                 | 74.0           | -20.1       | 1.00 V             | 360                  | 40.72            | 13.18                    |
| 6   | 7323.00     | 23.8 AV                 | 54.0           | -30.2       | 1.00 V             | 360                  | 10.62            | 13.18                    |

**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. Average value = peak reading +  $20\log(\text{duty cycle})$ .



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

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

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1   | *2480.00    | 100.9 PK                |                |             | 1.21 H             | 107                  | 102.96           | -2.06                    |
| 2   | *2480.00    | 70.8 AV                 |                |             | 1.21 H             | 107                  | 72.86            | -2.06                    |
| 3   | 2483.50     | 48.3 PK                 | 74.0           | -25.7       | 1.21 H             | 107                  | 50.33            | -2.03                    |
| 4   | 2483.50     | 18.2 AV                 | 54.0           | -35.8       | 1.21 H             | 107                  | 20.23            | -2.03                    |
| 5   | 4960.00     | 46.5 PK                 | 74.0           | -27.5       | 1.00 H             | 149                  | 40.24            | 6.26                     |
| 6   | 4960.00     | 16.4 AV                 | 54.0           | -37.6       | 1.00 H             | 149                  | 10.14            | 6.26                     |
| 7   | 7440.00     | 55.3 PK                 | 74.0           | -18.7       | 1.00 H             | 156                  | 42.17            | 13.13                    |
| 8   | 7440.00     | 25.2 AV                 | 54.0           | -28.8       | 1.00 H             | 156                  | 12.07            | 13.13                    |

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

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1   | *2480.00    | 98.6 PK                 |                |             | 1.27 V             | 249                  | 100.66           | -2.06                    |
| 2   | *2480.00    | 68.5 AV                 |                |             | 1.27 V             | 249                  | 70.56            | -2.06                    |
| 3   | 2483.50     | 49.3 PK                 | 74.0           | -24.7       | 1.27 V             | 249                  | 51.33            | -2.03                    |
| 4   | 2483.50     | 19.2 AV                 | 54.0           | -34.8       | 1.27 V             | 249                  | 21.23            | -2.03                    |
| 5   | 4960.00     | 47.5 PK                 | 74.0           | -26.5       | 1.00 V             | 163                  | 41.24            | 6.26                     |
| 6   | 4960.00     | 17.4 AV                 | 54.0           | -36.6       | 1.00 V             | 163                  | 11.14            | 6.26                     |
| 7   | 7440.00     | 54.0 PK                 | 74.0           | -20.0       | 1.00 V             | 360                  | 40.87            | 13.13                    |
| 8   | 7440.00     | 23.9 AV                 | 54.0           | -30.1       | 1.00 V             | 360                  | 10.77            | 13.13                    |

**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.





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### BT\_8DPSK

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

#### 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   | 2390.00     | 49.5 PK                 | 74.0           | -24.5       | 1.27 H             | 103                  | 51.97            | -2.47                    |
| 2   | 2390.00     | 19.4 AV                 | 54.0           | -34.6       | 1.27 H             | 103                  | 21.87            | -2.47                    |
| 3   | *2402.00    | 98.0 PK                 |                |             | 1.27 H             | 103                  | 100.41           | -2.41                    |
| 4   | *2402.00    | 67.9 AV                 |                |             | 1.27 H             | 103                  | 70.31            | -2.41                    |
| 5   | 4804.00     | 46.1 PK                 | 74.0           | -27.9       | 1.01 H             | 127                  | 40.48            | 5.62                     |
| 6   | 4804.00     | 16.0 AV                 | 54.0           | -38.0       | 1.01 H             | 127                  | 10.38            | 5.62                     |

#### 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   | 2390.00     | 48.4 PK                 | 74.0           | -25.6       | 1.35 V             | 257                  | 50.87            | -2.47                    |
| 2   | 2390.00     | 18.3 AV                 | 54.0           | -35.7       | 1.35 V             | 257                  | 20.77            | -2.47                    |
| 3   | *2402.00    | 95.8 PK                 |                |             | 1.35 V             | 257                  | 98.21            | -2.41                    |
| 4   | *2402.00    | 65.7 AV                 |                |             | 1.35 V             | 257                  | 68.11            | -2.41                    |
| 5   | 4804.00     | 47.3 PK                 | 74.0           | -26.7       | 1.09 V             | 172                  | 41.68            | 5.62                     |
| 6   | 4804.00     | 17.2 AV                 | 54.0           | -36.8       | 1.09 V             | 172                  | 11.58            | 5.62                     |

#### 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. Average value = peak reading +  $20\log(\text{duty cycle})$ .



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

**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   | *2441.00    | 100.0 PK                |                |             | 1.18 H             | 105                  | 102.24           | -2.24                    |
| 2   | *2441.00    | 69.9 AV                 |                |             | 1.18 H             | 105                  | 72.14            | -2.24                    |
| 3   | 4882.00     | 45.5 PK                 | 74.0           | -28.5       | 1.09 H             | 126                  | 39.56            | 5.94                     |
| 4   | 4882.00     | 15.4 AV                 | 54.0           | -38.6       | 1.09 H             | 126                  | 9.46             | 5.94                     |
| 5   | 7323.00     | 55.5 PK                 | 74.0           | -18.5       | 1.06 H             | 142                  | 42.32            | 13.18                    |
| 6   | 7323.00     | 25.4 AV                 | 54.0           | -28.6       | 1.06 H             | 142                  | 12.22            | 13.18                    |

**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   | *2441.00    | 98.0 PK                 |                |             | 1.32 V             | 236                  | 100.24           | -2.24                    |
| 2   | *2441.00    | 67.9 AV                 |                |             | 1.32 V             | 236                  | 70.14            | -2.24                    |
| 3   | 4882.00     | 47.4 PK                 | 74.0           | -26.6       | 1.01 V             | 167                  | 41.46            | 5.94                     |
| 4   | 4882.00     | 17.3 AV                 | 54.0           | -36.7       | 1.01 V             | 167                  | 11.36            | 5.94                     |
| 5   | 7323.00     | 54.0 PK                 | 74.0           | -20.0       | 1.00 V             | 349                  | 40.82            | 13.18                    |
| 6   | 7323.00     | 23.9 AV                 | 54.0           | -30.1       | 1.00 V             | 349                  | 10.72            | 13.18                    |

**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. Average value = peak reading +  $20\log(\text{duty cycle})$ .



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

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

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1   | *2480.00    | 100.1 PK                |                |             | 1.20 H             | 107                  | 102.16           | -2.06                    |
| 2   | *2480.00    | 70.0 AV                 |                |             | 1.20 H             | 107                  | 72.06            | -2.06                    |
| 3   | 2483.50     | 47.8 PK                 | 74.0           | -26.2       | 1.20 H             | 107                  | 49.83            | -2.03                    |
| 4   | 2483.50     | 17.7 AV                 | 54.0           | -36.3       | 1.20 H             | 107                  | 19.73            | -2.03                    |
| 5   | 4960.00     | 46.3 PK                 | 74.0           | -27.7       | 1.02 H             | 138                  | 40.04            | 6.26                     |
| 6   | 4960.00     | 16.2 AV                 | 54.0           | -37.8       | 1.02 H             | 138                  | 9.94             | 6.26                     |
| 7   | 7440.00     | 54.8 PK                 | 74.0           | -19.2       | 1.04 H             | 144                  | 41.67            | 13.13                    |
| 8   | 7440.00     | 24.7 AV                 | 54.0           | -29.3       | 1.04 H             | 144                  | 11.57            | 13.13                    |

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

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1   | *2480.00    | 98.9 PK                 |                |             | 1.41 V             | 237                  | 100.96           | -2.06                    |
| 2   | *2480.00    | 68.8 AV                 |                |             | 1.41 V             | 237                  | 70.86            | -2.06                    |
| 3   | 2483.50     | 49.6 PK                 | 74.0           | -24.4       | 1.41 V             | 237                  | 51.63            | -2.03                    |
| 4   | 2483.50     | 19.5 AV                 | 54.0           | -34.5       | 1.41 V             | 237                  | 21.53            | -2.03                    |
| 5   | 4960.00     | 47.8 PK                 | 74.0           | -26.2       | 1.04 V             | 163                  | 41.54            | 6.26                     |
| 6   | 4960.00     | 17.7 AV                 | 54.0           | -36.3       | 1.04 V             | 163                  | 11.44            | 6.26                     |
| 7   | 7440.00     | 54.1 PK                 | 74.0           | -19.9       | 1.00 V             | 360                  | 40.97            | 13.13                    |
| 8   | 7440.00     | 24.0 AV                 | 54.0           | -30.0       | 1.00 V             | 360                  | 10.87            | 13.13                    |

**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.

## 5 TEST TYPES AND RESULTS (DTS)

### 5.1 CONDUCTED OUTPUT POWER MEASUREMENT

#### 5.1.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

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

#### 5.1.2 INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| Power meter<br>Anritsu     | ML2495A   | 1014008    | Apr. 30, 2014   | Apr. 29, 2015    |
| Power sensor<br>Anritsu    | MA2411B   | 0917122    | Apr. 30, 2014   | Apr. 29, 2015    |

**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. Tested date : Oct. 24, 2014

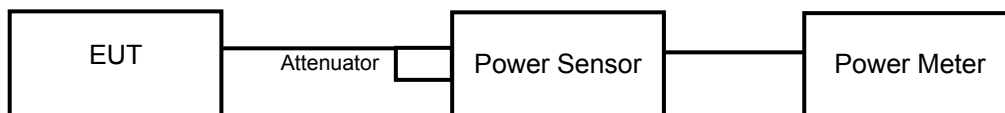
#### 5.1.3 TEST PROCEDURES

The peak / average power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak / average power sensor. Record the peak power level.

#### 5.1.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.1.5 TEST SETUP



### 5.1.6 EUT OPERATING CONDITIONS

The software (Artgui.exe) provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

### 5.1.7 TEST RESULTS

#### FOR PEAK POWER

#### BT\_LE-GFSK

| CHANNEL | FREQUENCY (MHz) | PEAK POWER (mW) | PEAK POWER (dBm) | LIMIT (dBm) | PASS/FAIL |
|---------|-----------------|-----------------|------------------|-------------|-----------|
| 0       | 2402            | 2.158           | 3.34             | 30          | PASS      |
| 19      | 2440            | 2.28            | 3.58             | 30          | PASS      |
| 39      | 2480            | 2.393           | 3.79             | 30          | PASS      |

#### FOR AVERAGE POWER

#### BT\_LE-GFSK

| CHANNEL | FREQUENCY (MHz) | AVERAGE POWER (mW) | AVERAGE POWER (dBm) |
|---------|-----------------|--------------------|---------------------|
| 0       | 2402            | 2.070              | 3.16                |
| 19      | 2440            | 2.203              | 3.43                |
| 39      | 2480            | 2.333              | 3.68                |

## 5.2 RADIATED EMISSION & Band Edge MEASUREMENT

### 5.2.1 LIMITS OF 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.



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## 5.2.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER              | MODEL NO.        | SERIAL NO.                      | CALIBRATED DATE | CALIBRATED UNTIL |
|---|------------------|---------------------------------|-----------------|------------------|
| MXE EMI Receiver<br>Agilent             | N9038A           | MY51210105                      | July 21, 2014   | July 20, 2015    |
| Pre-Amplifier<br>Mini-Circuits          | ZFL-1000VH2<br>B | AMP-ZFL-03                      | Nov. 13, 2013   | Nov. 12, 2014    |
| Trilog Broadband Antenna<br>SCHWARZBECK | VULB 9168        | 9168-360                        | Feb. 26, 2014   | Feb. 25, 2015    |
| RF Cable                                | NA               | CHGCAB_001                      | Oct. 04, 2014   | Oct. 03, 2015    |
| Horn_Antenna<br>AISL                    | AIH.8018         | 0000320091110                   | Aug. 27, 2014   | Aug. 26, 2015    |
| Pre-Amplifier<br>Agilent                | 8449B            | 3008A02578                      | June 24, 2014   | June 23, 2015    |
| RF Cable                                | NA               | 131205<br>131214<br>SNMY23684/4 | Jan. 17, 2014   | Jan. 16, 2015    |
| Spectrum Analyzer<br>R&S                | FSV40            | 100964                          | July 05, 2014   | July 04, 2015    |
| Pre-Amplifier<br>SPACEK LABS            | SLKKa-48-6       | 9K16                            | Nov. 13, 2013   | Nov. 12, 2014    |
| Horn_Antenna<br>SCHWARZBECK             | BBHA 9170        | 9170-424                        | Aug. 26, 2014   | Aug. 25, 2015    |
| RF Cable                                | NA               | RF104-121<br>RF104-204          | Dec. 12, 2013   | Dec. 11, 2014    |
| Antenna Tower & Turn Table<br>CT        | NA               | 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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.
7. Tested Date: Oct. 12 to 14, 2014



### 5.2.3 TEST PROCEDURES

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

**Note:**

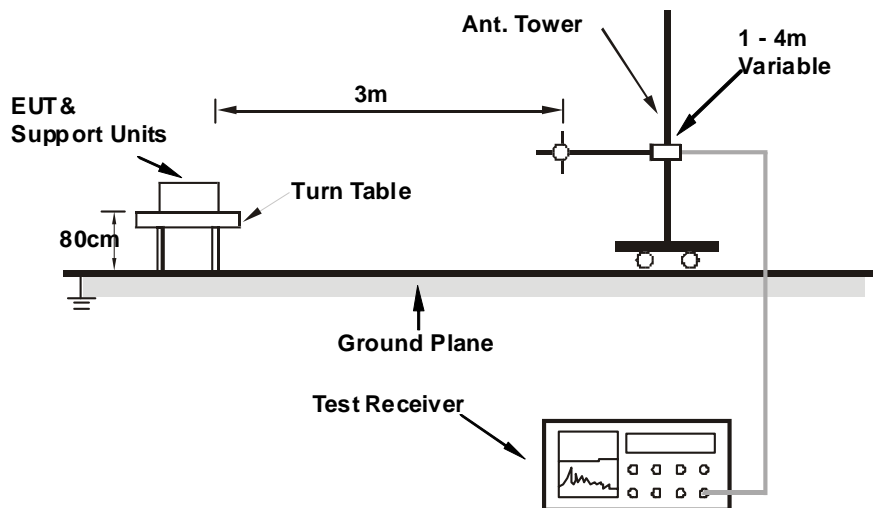
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

### 5.2.4 DEVIATION FROM TEST STANDARD

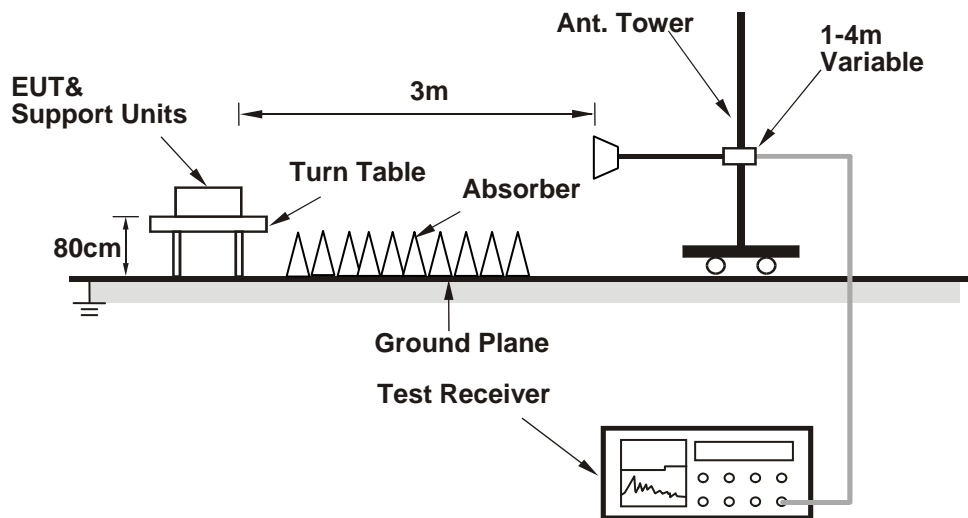
No deviation

## 5.2.5 TEST SETUP

### <Frequency Range below 1GHz>



### <Frequency Range above 1GHz>



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

## 5.2.6 EUT OPERATING CONDITIONS

1. Connect the EUT with the support unit A (Notebook Computer) which is placed on a testing table.
2. The communication partner run test program “Artgui.exe” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

## 5.2.7 TEST RESULTS

### BELOW 1GHz WORST-CASE DATA

#### BT\_LE-GFSK

|                        |               |                          |                 |
|------------------------|---------------|--------------------------|-----------------|
| <b>CHANNEL</b>         | TX Channel 39 | <b>DETECTOR FUNCTION</b> | Quasi-Peak (QP) |
| <b>FREQUENCY RANGE</b> | 30MHz ~ 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   | 240.01        | 38.8 QP                 | 46.0           | -7.2        | 1.00 H             | 354                  | 53.73            | -14.91                   |
| 2   | 498.90        | 40.6 QP                 | 46.0           | -5.4        | 1.50 H             | 224                  | 47.95            | -7.36                    |
| 3   | 698.04        | 41.1 QP                 | 46.0           | -5.0        | 1.00 H             | 258                  | 44.41            | -3.36                    |
| 4   | <b>760.07</b> | <b>43.0 QP</b>          | <b>46.0</b>    | <b>-3.0</b> | <b>1.00 H</b>      | <b>235</b>           | <b>44.56</b>     | <b>-1.54</b>             |
| 5   | 851.54        | 43.0 QP                 | 46.0           | -3.0        | 1.00 H             | 213                  | 43.52            | -0.55                    |
| 6   | 961.64        | 40.3 QP                 | 54.0           | -13.7       | 1.50 H             | 176                  | 38.98            | 1.30                     |
| 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   | 31.64         | 34.1 QP                 | 40.0           | -5.9        | 1.34 V             | 124                  | 48.77            | -14.66                   |
| 2   | 166.01        | 35.1 QP                 | 43.5           | -8.4        | 1.35 V             | 204                  | 48.77            | -13.66                   |
| 3   | 299.01        | 42.1 QP                 | 46.0           | -3.9        | 1.34 V             | 154                  | 54.63            | -12.52                   |
| 4   | 497.64        | 39.1 QP                 | 46.0           | -6.9        | 1.34 V             | 201                  | 46.47            | -7.36                    |
| 5   | 707.44        | 39.4 QP                 | 46.0           | -6.6        | 1.24 V             | 245                  | 42.71            | -3.27                    |
| 6   | 833.01        | 41.1 QP                 | 46.0           | -4.9        | 1.34 V             | 201                  | 41.80            | -0.69                    |

#### 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



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ABOVE 1GHz DATA

BT\_LE-GFSK

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

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   | 2390.00     | 48.7 PK                 | 74.0           | -25.3       | 1.25 H             | 107                  | 51.17            | -2.47                    |
| 2   | 2390.00     | 39.3 AV                 | 54.0           | -14.7       | 1.25 H             | 107                  | 41.77            | -2.47                    |
| 3   | *2402.00    | 96.0 PK                 |                |             | 1.25 H             | 107                  | 98.41            | -2.41                    |
| 4   | *2402.00    | 85.5 AV                 |                |             | 1.25 H             | 107                  | 87.91            | -2.41                    |
| 5   | 4804.00     | 46.2 PK                 | 74.0           | -27.8       | 1.09 H             | 144                  | 40.58            | 5.62                     |
| 6   | 4804.00     | 34.0 AV                 | 54.0           | -20.0       | 1.09 H             | 144                  | 28.38            | 5.62                     |

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   | 2390.00     | 47.5 PK                 | 74.0           | -26.5       | 1.41 V             | 238                  | 49.97            | -2.47                    |
| 2   | 2390.00     | 37.9 AV                 | 54.0           | -16.1       | 1.41 V             | 238                  | 40.37            | -2.47                    |
| 3   | *2402.00    | 94.4 PK                 |                |             | 1.41 V             | 238                  | 96.81            | -2.41                    |
| 4   | *2402.00    | 83.7 AV                 |                |             | 1.41 V             | 238                  | 86.11            | -2.41                    |
| 5   | 4804.00     | 47.7 PK                 | 74.0           | -26.3       | 1.08 V             | 163                  | 42.08            | 5.62                     |
| 6   | 4804.00     | 34.2 AV                 | 54.0           | -19.8       | 1.08 V             | 163                  | 28.58            | 5.62                     |

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.



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|                        |               |                          |           |
|------------------------|---------------|--------------------------|-----------|
| <b>CHANNEL</b>         | TX Channel 19 | <b>DETECTOR FUNCTION</b> | Peak (PK) |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz  |                          |           |

**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   | *2440.00    | 99.2 PK                 |                |             | 1.20 H             | 106                  | 101.44           | -2.24                    |
| 2   | *2440.00    | 88.2 AV                 |                |             | 1.20 H             | 106                  | 90.44            | -2.24                    |
| 3   | 4880.00     | 46.6 PK                 | 74.0           | -27.4       | 1.12 H             | 159                  | 40.66            | 5.94                     |
| 4   | 4880.00     | 34.4 AV                 | 54.0           | -19.6       | 1.12 H             | 159                  | 28.46            | 5.94                     |
| 5   | 7320.00     | 55.1 PK                 | 74.0           | -18.9       | 1.06 H             | 163                  | 41.91            | 13.19                    |
| 6   | 7320.00     | 40.8 AV                 | 54.0           | -13.2       | 1.06 H             | 163                  | 27.61            | 13.19                    |

**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   | *2440.00    | 97.3 PK                 |                |             | 1.40 V             | 246                  | 99.54            | -2.24                    |
| 2   | *2440.00    | 86.4 AV                 |                |             | 1.40 V             | 246                  | 88.64            | -2.24                    |
| 3   | 4880.00     | 47.9 PK                 | 74.0           | -26.1       | 1.12 V             | 171                  | 41.96            | 5.94                     |
| 4   | 4880.00     | 33.9 AV                 | 54.0           | -20.1       | 1.12 V             | 171                  | 27.96            | 5.94                     |
| 5   | 7320.00     | 53.2 PK                 | 74.0           | -20.8       | 1.12 V             | 360                  | 40.01            | 13.19                    |
| 6   | 7320.00     | 40.7 AV                 | 54.0           | -13.3       | 1.12 V             | 360                  | 27.51            | 13.19                    |

**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.



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

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

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1   | *2480.00    | 100.7 PK                |                |             | 1.22 H             | 107                  | 102.76           | -2.06                    |
| 2   | *2480.00    | 89.4 AV                 |                |             | 1.22 H             | 107                  | 91.46            | -2.06                    |
| 3   | 2483.50     | 47.6 PK                 | 74.0           | -26.4       | 1.22 H             | 107                  | 49.63            | -2.03                    |
| 4   | 2483.50     | 34.1 AV                 | 54.0           | -19.9       | 1.22 H             | 107                  | 36.13            | -2.03                    |
| 5   | 4960.00     | 46.2 PK                 | 74.0           | -27.8       | 1.06 H             | 159                  | 39.94            | 6.26                     |
| 6   | 4960.00     | 34.1 AV                 | 54.0           | -19.9       | 1.06 H             | 159                  | 27.84            | 6.26                     |
| 7   | 7440.00     | 55.7 PK                 | 74.0           | -18.3       | 1.09 H             | 168                  | 42.57            | 13.13                    |
| 8   | 7440.00     | 41.2 AV                 | 54.0           | -12.8       | 1.09 H             | 168                  | 28.07            | 13.13                    |

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

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1   | *2480.00    | 98.7 PK                 |                |             | 1.04 V             | 247                  | 100.76           | -2.06                    |
| 2   | *2480.00    | 87.8 AV                 |                |             | 1.04 V             | 247                  | 89.86            | -2.06                    |
| 3   | 2483.50     | 50.8 PK                 | 74.0           | -23.2       | 1.04 V             | 247                  | 52.83            | -2.03                    |
| 4   | 2483.50     | 33.7 AV                 | 54.0           | -20.3       | 1.04 V             | 247                  | 35.73            | -2.03                    |
| 5   | 4960.00     | 47.6 PK                 | 74.0           | -26.4       | 1.12 V             | 156                  | 41.34            | 6.26                     |
| 6   | 4960.00     | 33.8 AV                 | 54.0           | -20.2       | 1.12 V             | 156                  | 27.54            | 6.26                     |
| 7   | 7440.00     | 53.4 PK                 | 74.0           | -20.6       | 1.06 V             | 360                  | 40.27            | 13.13                    |
| 8   | 7440.00     | 41.2 AV                 | 54.0           | -12.8       | 1.06 V             | 360                  | 28.07            | 13.13                    |

**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.



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## 6 PHOTOGRAPHS OF THE TEST CONFIGURATION

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





## 7 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.

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

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

## 8 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

--- END ---