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## **APPENDIX 2: Data of EMI test**

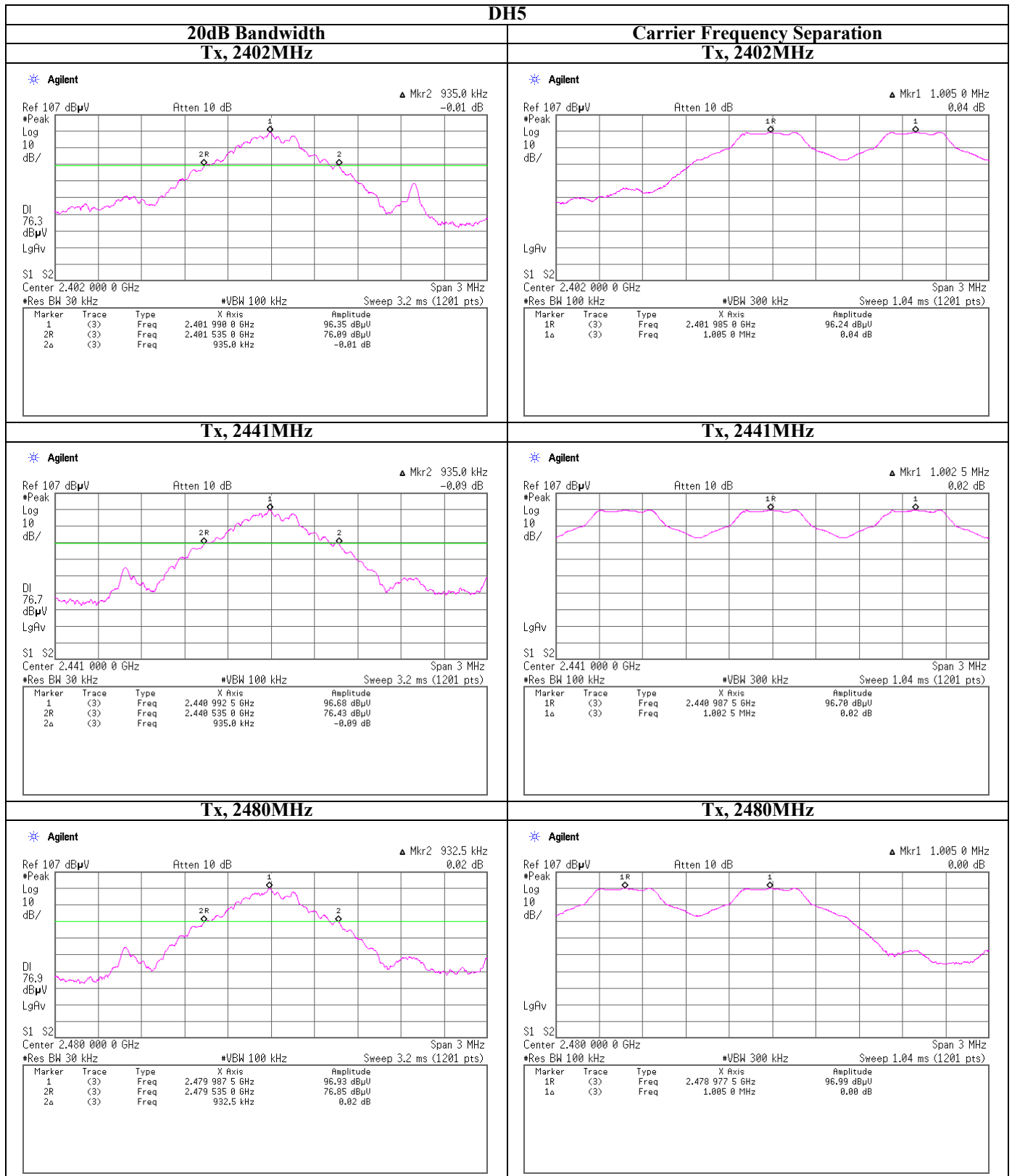
### **20dB Bandwidth and Carrier Frequency Separation**

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.5 Shielded Room  
Date                              2010/11/4  
Temperature / Humidity      21deg.C.                      , 51%  
Engineer                        Hikaru Shirasawa  
Mode                              Tx,

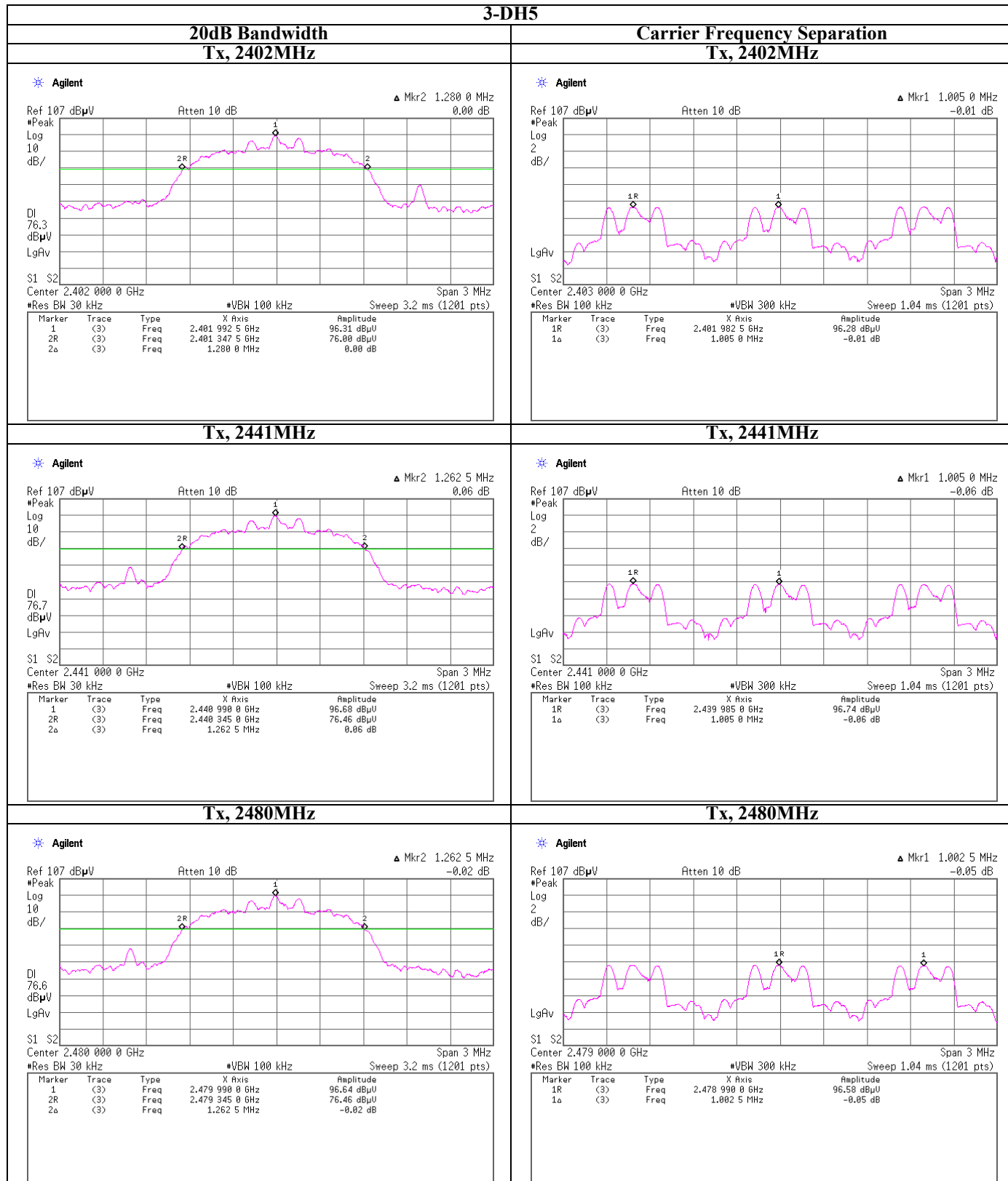
| Mode    | Freq.<br>[MHz] | 20dB<br>Bandwidth<br>[MHz] | Carrier<br>Frequency<br>Separation<br>[MHz] | Limit for<br>Carrier<br>Frequency<br>Separation<br>[MHz] |
|---------|----------------|----------------------------|---------------------------------------------|----------------------------------------------------------|
| DH5     | 2402.0         | 0.935                      | 1.005                                       | >= 0.623                                                 |
| DH5     | 2441.0         | 0.935                      | 1.003                                       | >= 0.623                                                 |
| DH5     | 2480.0         | 0.933                      | 1.005                                       | >= 0.622                                                 |
| 3DH5    | 2402.0         | 1.280                      | 1.005                                       | >= 0.853                                                 |
| 3DH5    | 2441.0         | 1.263                      | 1.005                                       | >= 0.842                                                 |
| 3DH5    | 2480.0         | 1.263                      | 1.003                                       | >= 0.842                                                 |
| Inquiry | 2441.0         | 0.823                      | 2.000                                       | >= 0.548                                                 |

Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).  
No limit applies to 20dB Bandwidth.

## 20dB Bandwidth and Carrier Frequency Separation



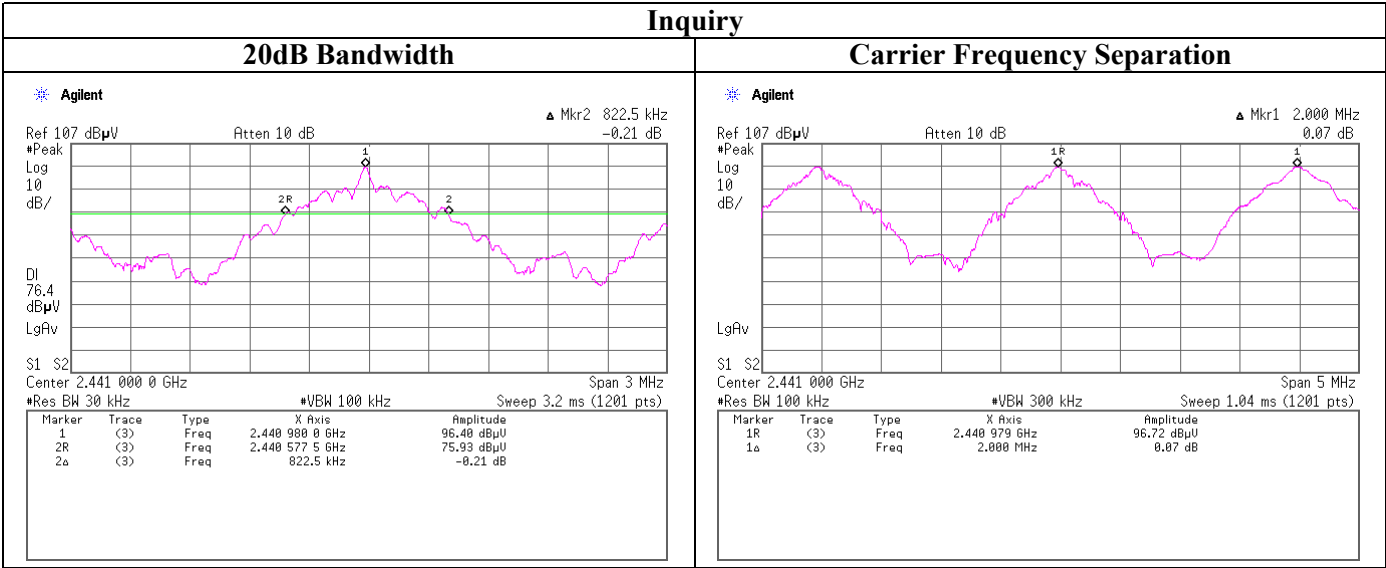
## 20dB Bandwidth and Carrier Frequency Separation



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20dB Bandwidth and Carrier Frequency Separation



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## Number of Hopping Frequency (Conducted)

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.5 Shielded Room  
Date                                      2010/11/5  
Temperature / Humidity      22deg.C.                      , 53%  
Engineer                              Tatsuya Arai  
Mode                                      Tx,

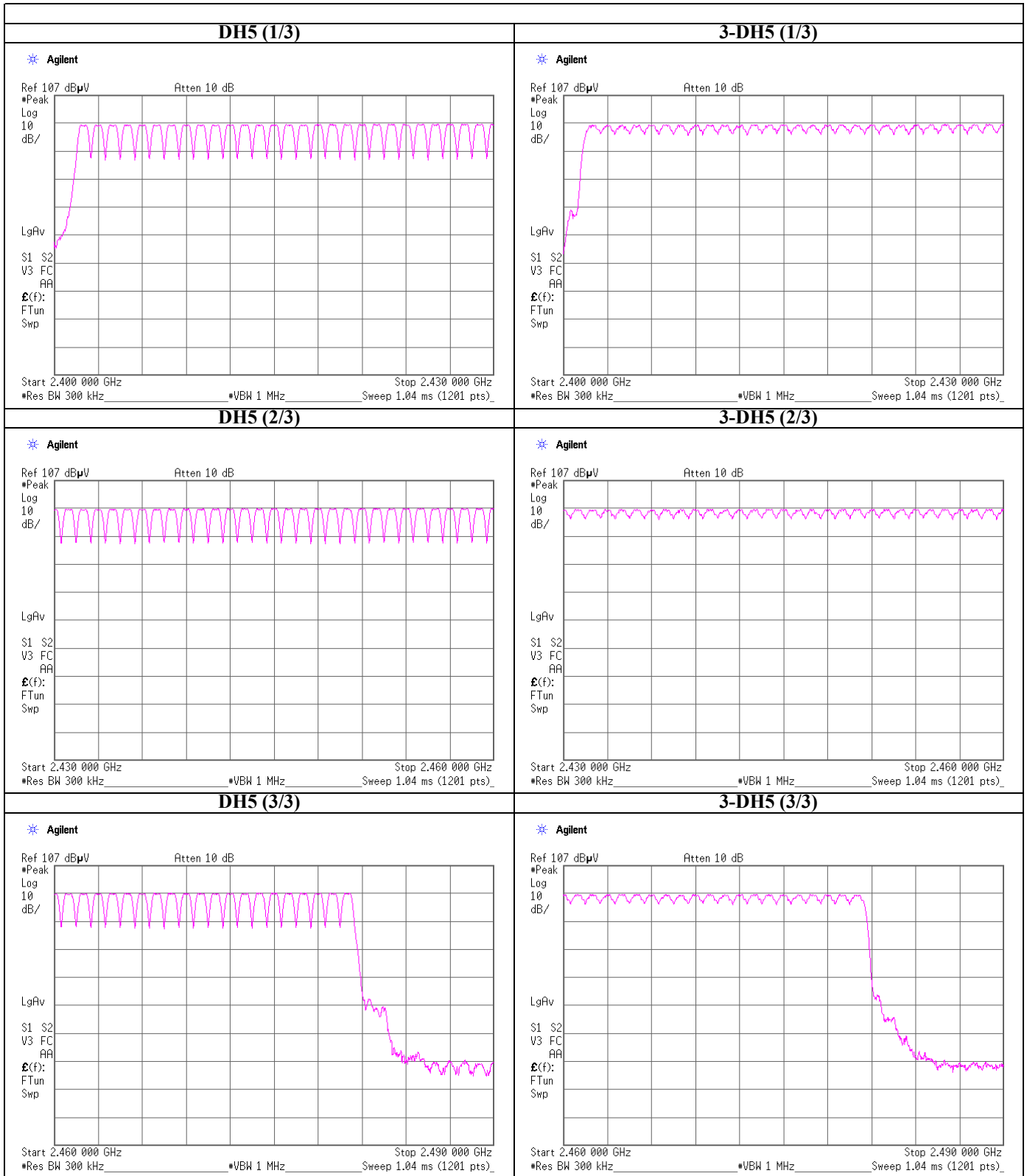
| Mode    | Number of Channel [times] | Limit [times] |
|---------|---------------------------|---------------|
| DH5     | 79                        | >=15          |
| 3-DH5   | 79                        | >=15          |
| Inquiry | 32                        | >=15          |

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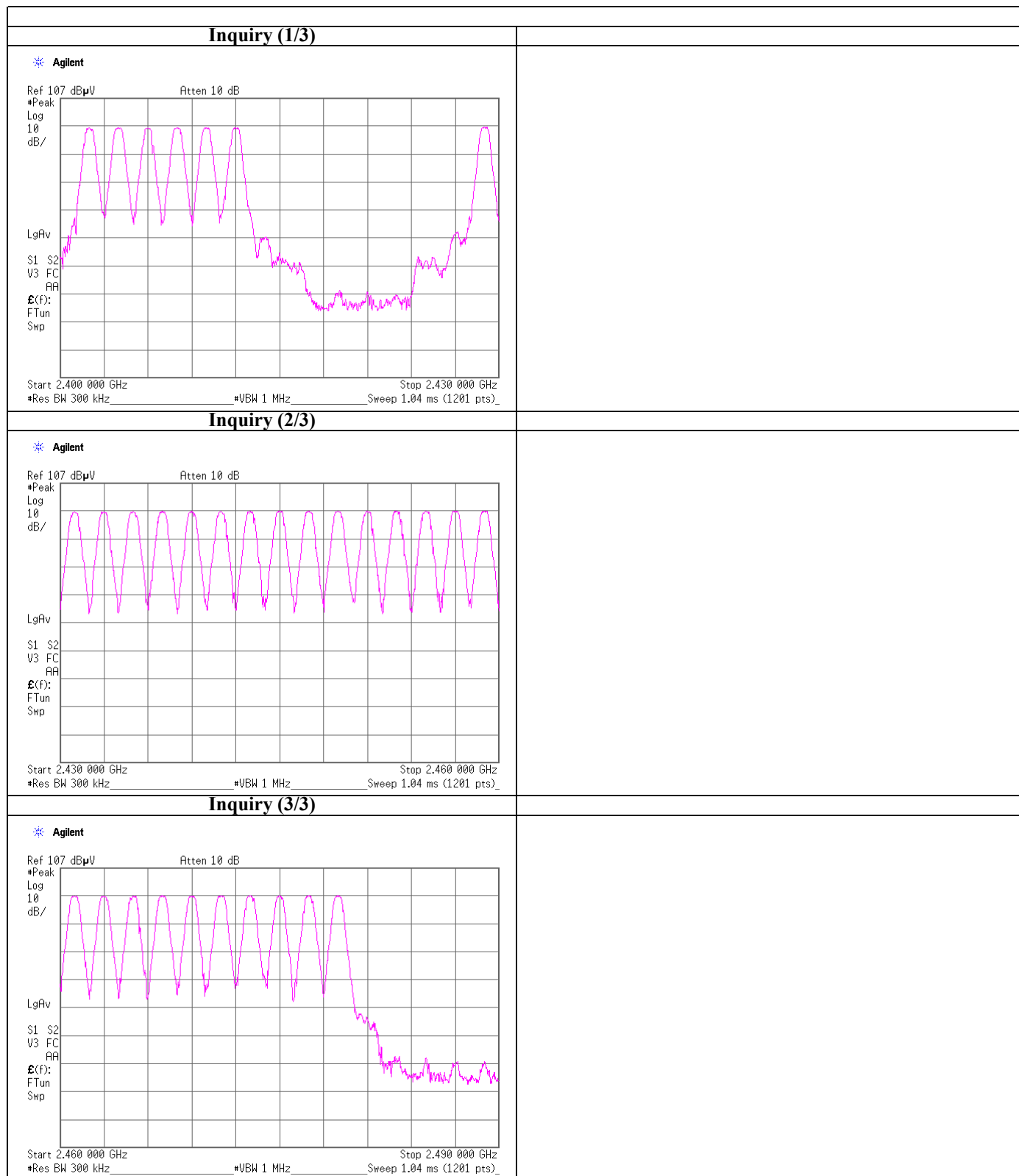
**UL Japan, Inc.**  
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## Number of Hopping Frequency



### Number of Hopping Frequency



## Dwell Time (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room  
Date 2010/11/5  
Temperature / Humidity 22deg.C. , 53%  
Engineer Tatsuya Arai  
Mode Tx,

| Mode    | Number of transmission<br>in a 31.6(79 Hopping x 0.4)<br>/ 12.8(32 Hopping x 0.4)second period | Length of<br>transmission<br>time<br>[msec] | Result<br>[msec] | Limit<br>[msec] |
|---------|------------------------------------------------------------------------------------------------|---------------------------------------------|------------------|-----------------|
| DH1     | 50.4 times / 5 sec. x 31.6 sec. = 319 times                                                    | 0.403                                       | 129              | 400             |
| DH3     | 25.0 times / 5 sec. x 31.6 sec. = 158 times                                                    | 1.662                                       | 263              | 400             |
| DH5     | 16.8 times / 5 sec. x 31.6 sec. = 107 times                                                    | 2.913                                       | 312              | 400             |
| 3DH1    | 51.0 times / 5 sec. x 31.6 sec. = 323 times                                                    | 0.418                                       | 135              | 400             |
| 3DH3    | 25.0 times / 5 sec. x 31.6 sec. = 158 times                                                    | 1.670                                       | 264              | 400             |
| 3DH5    | 16.8 times / 5 sec. x 31.6 sec. = 107 times                                                    | 2.923                                       | 313              | 400             |
| Inquiry | 100.0 times / 1 sec. x 12.8 sec. = 1280 times                                                  | 0.106                                       | 136              | 400             |

Sample Calculation

Result = Number of transmission x Length of transmission time

\*Average data of 5 tests.(except Inquiry)

| Mode | Sampling [times] |    |    |    |    | Average<br>[times] |
|------|------------------|----|----|----|----|--------------------|
|      | 1                | 2  | 3  | 4  | 5  |                    |
| DH1  | 50               | 51 | 50 | 50 | 51 | 50.4               |
| DH3  | 25               | 25 | 25 | 25 | 25 | 25                 |
| DH5  | 17               | 16 | 17 | 17 | 17 | 16.8               |
| 3DH1 | 51               | 51 | 51 | 51 | 51 | 51                 |
| 3DH3 | 25               | 25 | 25 | 25 | 25 | 25                 |
| 3DH5 | 17               | 17 | 17 | 16 | 17 | 16.8               |

Sample Calculation

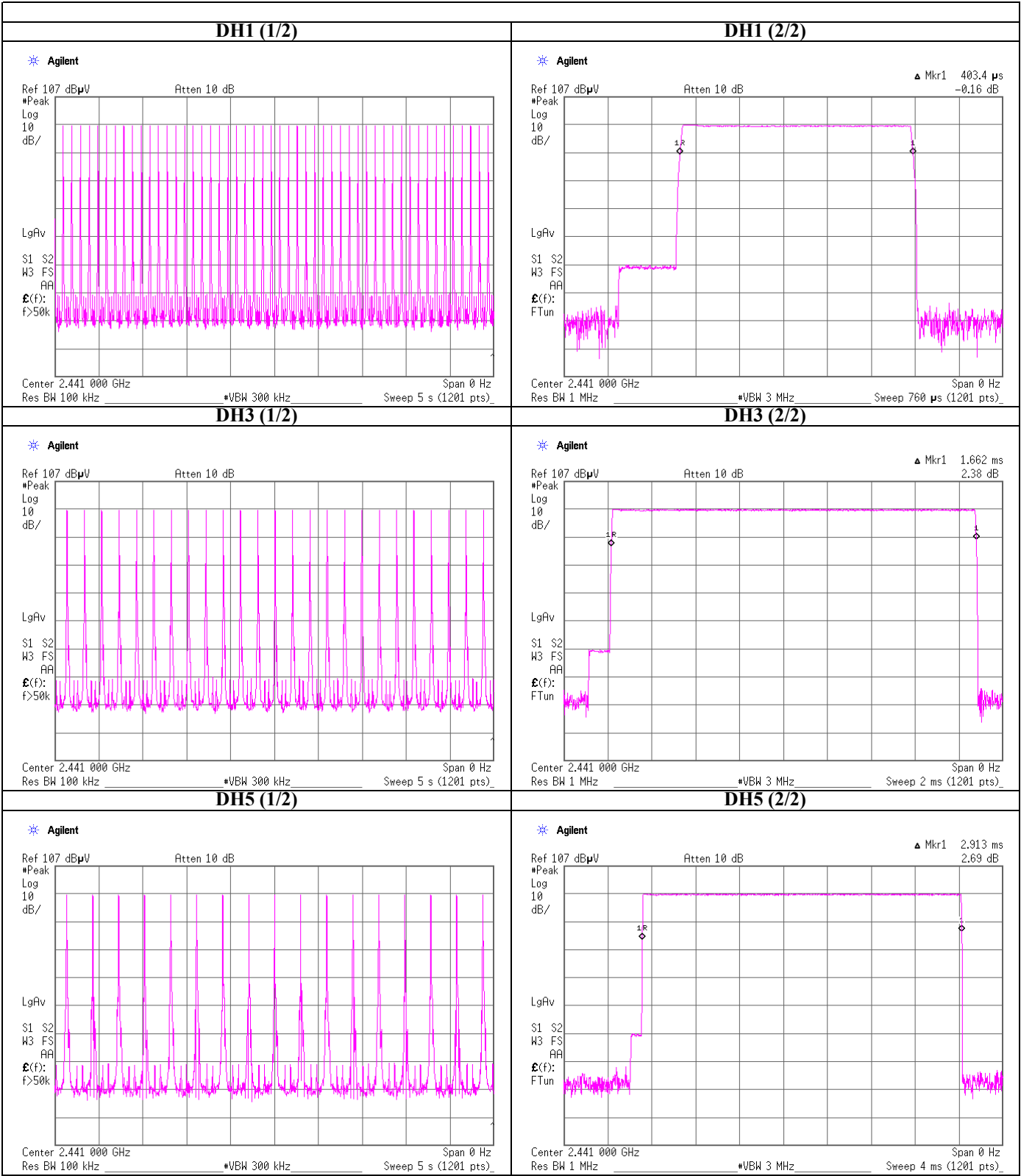
Average= Summation(Sampling 1 to 5) / 5

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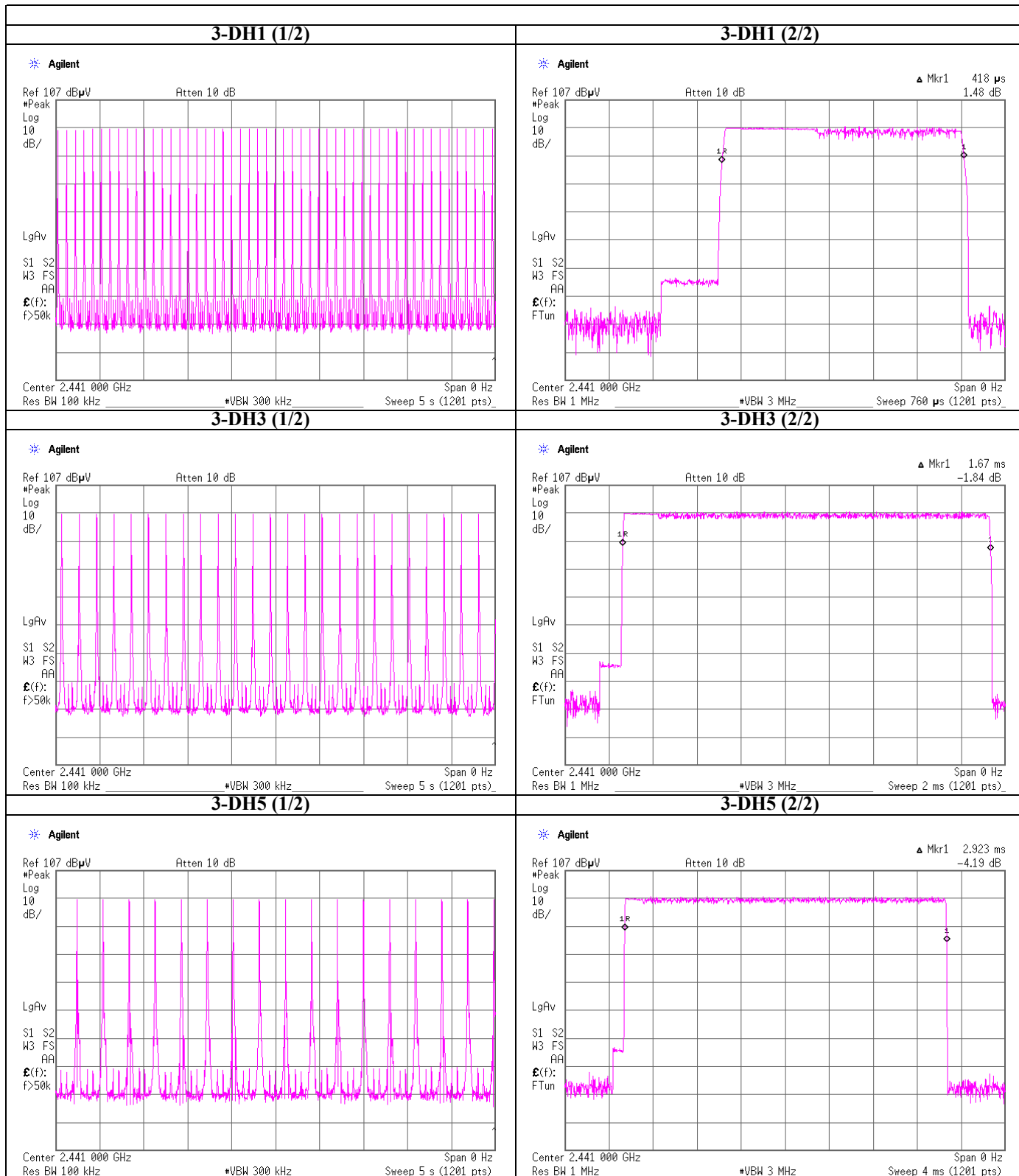
**Dwell time**



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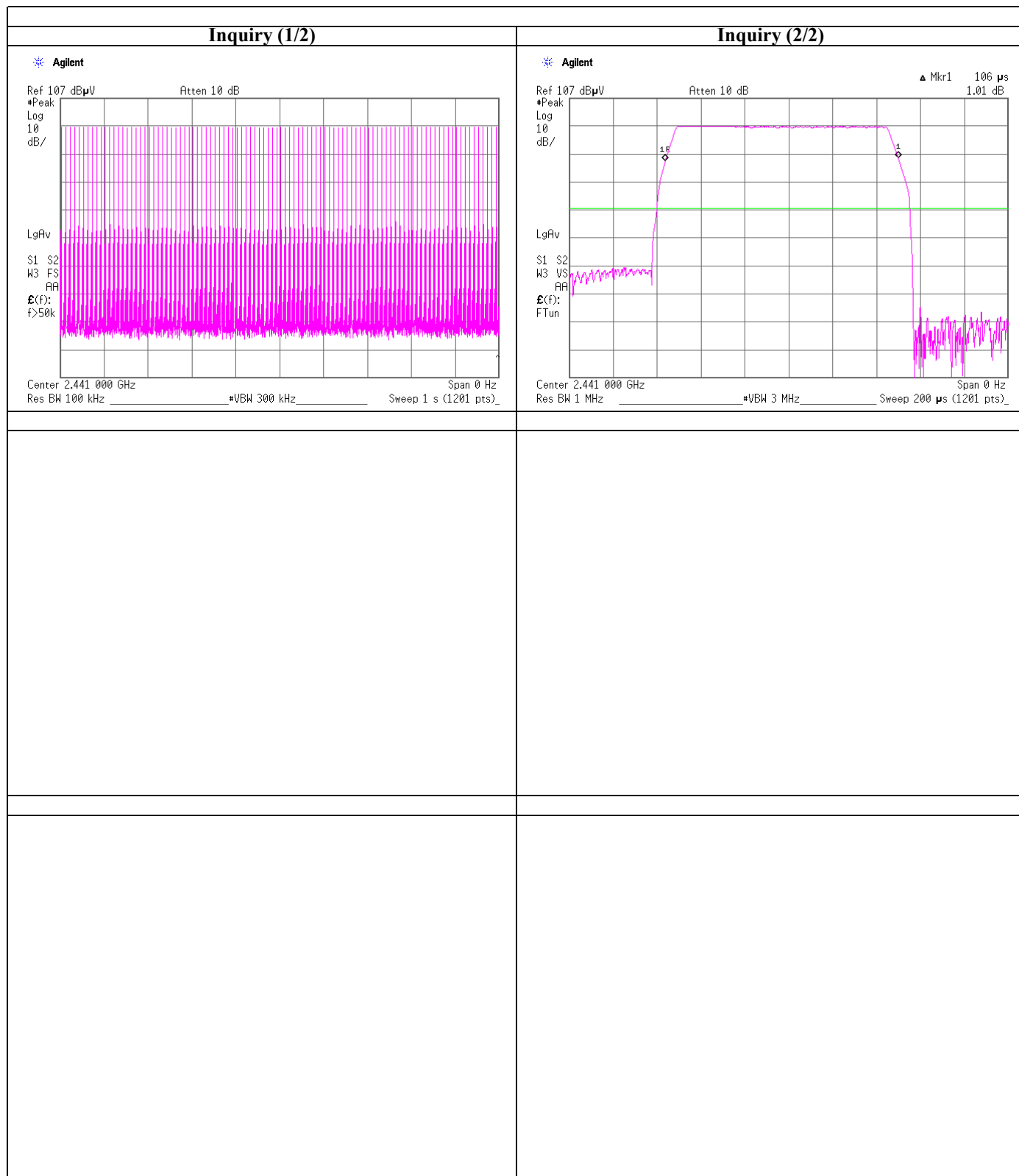
## Dwell time



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### Dwell time



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## Peak Output Power (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room  
Date 2010/11/5  
Temperature / Humidity 22deg.C. , 53%  
Engineer Tatsuya Arai  
Mode Tx,

### **BDR (DH5)**

| Ch   | Freq.<br>[MHz] | P/M (PK)<br>Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Atten.<br>Loss<br>[dB] | Result |      | Limit |      | Margin<br>[dB] |
|------|----------------|------------------------------|-----------------------|------------------------|--------|------|-------|------|----------------|
|      |                |                              |                       |                        | [dBm]  | [mW] | [dBm] | [mW] |                |
| Low  | 2402.0         | -10.22                       | 0.78                  | 9.97                   | 0.53   | 1.13 | 20.97 | 125  | 20.44          |
| Mid  | 2441.0         | -9.90                        | 0.78                  | 9.97                   | 0.85   | 1.22 | 20.97 | 125  | 20.12          |
| High | 2480.0         | -9.62                        | 0.79                  | 9.97                   | 1.14   | 1.30 | 20.97 | 125  | 19.83          |

### **EDR (2-DH5)**

| Ch   | Freq.<br>[MHz] | P/M (PK)<br>Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Atten.<br>Loss<br>[dB] | Result |      | Limit |      | Margin<br>[dB] |
|------|----------------|------------------------------|-----------------------|------------------------|--------|------|-------|------|----------------|
|      |                |                              |                       |                        | [dBm]  | [mW] | [dBm] | [mW] |                |
| Low  | 2402.0         | -9.62                        | 0.78                  | 9.97                   | 1.13   | 1.30 | 20.97 | 125  | 19.84          |
| Mid  | 2441.0         | -9.28                        | 0.78                  | 9.97                   | 1.47   | 1.40 | 20.97 | 125  | 19.50          |
| High | 2480.0         | -9.25                        | 0.79                  | 9.97                   | 1.51   | 1.42 | 20.97 | 125  | 19.46          |

### **EDR (3-DH5)**

| Ch   | Freq.<br>[MHz] | P/M (PK)<br>Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Atten.<br>Loss<br>[dB] | Result |      | Limit |      | Margin<br>[dB] |
|------|----------------|------------------------------|-----------------------|------------------------|--------|------|-------|------|----------------|
|      |                |                              |                       |                        | [dBm]  | [mW] | [dBm] | [mW] |                |
| Low  | 2402.0         | -9.60                        | 0.78                  | 9.97                   | 1.15   | 1.30 | 20.97 | 125  | 19.82          |
| Mid  | 2441.0         | -9.19                        | 0.78                  | 9.97                   | 1.56   | 1.43 | 20.97 | 125  | 19.41          |
| High | 2480.0         | -9.10                        | 0.79                  | 9.97                   | 1.66   | 1.47 | 20.97 | 125  | 19.31          |

Sample Calculation:

Result = Reading + Cable Loss (supplied by customer) + Atten. Loss

\* In the above table, factor 0.0dB represents no use of Atten. and/or Filter.

\*The test result is rounded off to one or two decimal places, so some differences might be observed.

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## Radiated Emission

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.1 Semi Anechoic Chamber / No.3 Semi Anechoic Chamber  
Date                              2010/11/1                              2010/11/3  
Temperature / Humidity      23deg.C. , 58%                      23deg.C. , 40%  
Engineer                        Tatsuya Arai                              Akio Hayashi  
Mode                              Tx,                              2402 MHz  
                                         Bluetooth, DH5

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg.] | Remark     |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------------|-------------------|----------------|----------------|-----------------|------------|
| Hori.    | 77.790             | QP       | 40.6              | 6.6                | 7.6          | 31.8         | 23.0               | 40.0              | 17.0           | 400            | 342             |            |
| Hori.    | 173.268            | QP       | 41.7              | 16.0               | 8.6          | 31.8         | 34.5               | 43.5              | 9.0            | 186            | 136             |            |
| Hori.    | 249.861            | QP       | 36.3              | 17.6               | 9.2          | 31.7         | 31.4               | 46.0              | 14.6           | 131            | 170             |            |
| Hori.    | 264.023            | QP       | 36.6              | 18.0               | 9.3          | 31.7         | 32.2               | 46.0              | 13.8           | 146            | 56              |            |
| Hori.    | 324.005            | QP       | 41.6              | 14.7               | 6.7          | 31.8         | 31.2               | 46.0              | 14.8           | 126            | 348             |            |
| Hori.    | 1426.448           | PK       | 49.4              | 24.8               | 12.6         | 40.0         | 46.8               | 73.9              | 27.1           | 110            | 221             |            |
| Hori.    | 1601.969           | PK       | 48.2              | 25.5               | 12.7         | 40.1         | 46.3               | 73.9              | 27.6           | 100            | 39              |            |
| Hori.    | 2390.000           | PK       | 44.0              | 27.5               | 13.3         | 40.2         | 44.6               | 73.9              | 29.3           | 104            | 148             |            |
| Hori.    | 2400.000           | PK       | 48.7              | 27.5               | 13.3         | 40.2         | 49.3               | 73.9              | 24.6           | 104            | 148             |            |
| Hori.    | 3205.333           | PK       | 48.8              | 29.2               | 4.9          | 41.1         | 41.8               | 73.9              | 32.1           | 159            | 3               |            |
| Hori.    | 4804.000           | PK       | 55.5              | 31.5               | 5.5          | 40.1         | 52.4               | 73.9              | 21.5           | 143            | 213             |            |
| Hori.    | 7206.000           | PK       | 48.5              | 36.4               | 6.7          | 38.3         | 53.3               | 73.9              | 20.6           | 100            | 0               |            |
| Hori.    | 9608.000           | PK       | 45.0              | 37.9               | 7.8          | 37.3         | 53.4               | 73.9              | 20.5           | 100            | 0               |            |
| Hori.    | 12010.000          | PK       | 47.9              | 39.4               | 9.0          | 38.4         | 57.9               | 73.9              | 16.0           | 100            | 0               |            |
| Hori.    | 1426.448           | AV       | 43.7              | 24.8               | 12.6         | 40.0         | 41.1               | 53.9              | 12.8           | 110            | 221             | VBW = 10Hz |
| Hori.    | 1601.969           | AV       | 37.2              | 25.5               | 12.7         | 40.1         | 35.3               | 53.9              | 18.6           | 100            | 39              | VBW = 10Hz |
| Hori.    | 3205.333           | AV       | 37.1              | 29.2               | 4.9          | 41.1         | 30.1               | 53.9              | 23.8           | 159            | 3               | VBW = 10Hz |
| Vert.    | 80.601             | QP       | 37.8              | 6.6                | 7.6          | 31.8         | 20.2               | 40.0              | 19.8           | 100            | 14              |            |
| Vert.    | 173.264            | QP       | 40.3              | 16.0               | 8.6          | 31.8         | 33.1               | 43.5              | 10.4           | 100            | 26              |            |
| Vert.    | 577.000            | QP       | 37.8              | 18.8               | 8.3          | 32.0         | 32.9               | 46.0              | 13.1           | 100            | 171             |            |
| Vert.    | 1426.448           | PK       | 50.3              | 24.8               | 12.6         | 40.0         | 47.7               | 73.9              | 26.2           | 115            | 163             |            |
| Vert.    | 1601.969           | PK       | 47.3              | 25.5               | 12.7         | 40.1         | 45.4               | 73.9              | 28.5           | 111            | 161             |            |
| Vert.    | 2390.000           | PK       | 46.1              | 27.5               | 13.3         | 40.2         | 46.7               | 73.9              | 27.2           | 100            | 167             |            |
| Vert.    | 2400.000           | PK       | 46.4              | 27.5               | 13.3         | 40.2         | 47.0               | 73.9              | 26.9           | 100            | 167             |            |
| Vert.    | 3204.000           | PK       | 50.0              | 29.2               | 4.9          | 41.1         | 43.0               | 73.9              | 30.9           | 165            | 0               |            |
| Vert.    | 4804.000           | PK       | 56.0              | 31.5               | 5.5          | 40.1         | 52.9               | 73.9              | 21.0           | 100            | 161             |            |
| Vert.    | 7206.000           | PK       | 48.6              | 36.4               | 6.7          | 38.3         | 53.4               | 73.9              | 20.5           | 100            | 0               |            |
| Vert.    | 9608.000           | PK       | 45.1              | 37.9               | 7.8          | 37.3         | 53.5               | 73.9              | 20.4           | 100            | 0               |            |
| Vert.    | 12010.000          | PK       | 48.0              | 39.4               | 9.0          | 38.4         | 58.0               | 73.9              | 15.9           | 100            | 0               |            |
| Vert.    | 1426.448           | AV       | 43.4              | 24.8               | 12.6         | 40.0         | 40.8               | 53.9              | 13.1           | 115            | 163             | VBW = 10Hz |
| Vert.    | 1601.969           | AV       | 37.7              | 25.5               | 12.7         | 40.1         | 35.8               | 53.9              | 18.1           | 111            | 161             | VBW = 10Hz |
| Vert.    | 3204.000           | AV       | 39.9              | 29.2               | 4.9          | 41.1         | 32.9               | 53.9              | 21.0           | 165            | 0               | VBW = 10Hz |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

### Dwell time factor relaxation

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant<br>Factor<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Dwell<br>Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|-------------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 2390.000           | AV       | 34.2              | 27.5                    | 13.3         | 40.2         | -24.7                   | 10.1               | 54.0              | 43.9           | VBW = 300Hz |
| Hori.    | 2400.000           | AV       | 40.7              | 27.5                    | 13.3         | 40.2         | -24.7                   | 16.6               | 54.0              | 37.4           | VBW = 300Hz |
| Hori.    | 4804.000           | AV       | 49.6              | 31.5                    | 5.5          | 40.1         | -24.7                   | 21.8               | 54.0              | 32.2           | VBW = 300Hz |
| Hori.    | 7206.000           | AV       | 34.3              | 36.4                    | 6.7          | 38.3         | -24.7                   | 14.4               | 54.0              | 39.6           | VBW = 300Hz |
| Hori.    | 9608.000           | AV       | 32.0              | 37.9                    | 7.8          | 37.3         | -24.7                   | 15.7               | 54.0              | 38.3           | VBW = 300Hz |
| Hori.    | 12010.000          | AV       | 34.3              | 39.4                    | 9.0          | 38.4         | -24.7                   | 19.6               | 54.0              | 34.4           | VBW = 300Hz |
| Vert.    | 2390.000           | AV       | 34.2              | 27.5                    | 13.3         | 40.2         | -24.7                   | 10.1               | 54.0              | 43.9           | VBW = 300Hz |
| Vert.    | 2400.000           | AV       | 38.3              | 27.5                    | 13.3         | 40.2         | -24.7                   | 14.2               | 54.0              | 39.8           | VBW = 300Hz |
| Vert.    | 4804.000           | AV       | 50.4              | 31.5                    | 5.5          | 40.1         | -24.7                   | 22.6               | 54.0              | 31.4           | VBW = 300Hz |
| Vert.    | 7206.000           | AV       | 34.3              | 36.4                    | 6.7          | 38.3         | -24.7                   | 14.4               | 54.0              | 39.6           | VBW = 300Hz |
| Vert.    | 9608.000           | AV       | 32.1              | 37.9                    | 7.8          | 37.3         | -24.7                   | 15.8               | 54.0              | 38.2           | VBW = 300Hz |
| Vert.    | 12010.000          | AV       | 34.3              | 39.4                    | 9.0          | 38.4         | -24.7                   | 19.6               | 54.0              | 34.4           | VBW = 300Hz |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter)

- Gain(Amplifier) + Dwell time factor (Refer to Duty Fctor data)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

\*No noise was detected above the 5th order harmonics.

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## Radiated Emission

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.1 Semi Anechoic Chamber / No.3 Semi Anechoic Chamber  
Date                              2010/11/1                              2010/11/3  
Temperature / Humidity      23deg.C. , 58%                      23deg.C. , 40%  
Engineer                        Tatsuya Arai                              Akio Hayashi  
Mode                              Tx,                              2441 MHz  
                                         Bluetooth, DHS

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg.] | Remark     |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------------|-------------------|----------------|----------------|-----------------|------------|
| Hori.    | 81.975             | QP       | 41.0              | 6.9                | 7.6          | 31.8         | 23.7               | 40.0              | 16.3           | 400            | 136             |            |
| Hori.    | 173.282            | QP       | 42.0              | 16.0               | 8.6          | 31.8         | 34.8               | 43.5              | 8.7            | 179            | 132             |            |
| Hori.    | 216.004            | QP       | 36.3              | 17.1               | 8.9          | 31.7         | 30.6               | 46.0              | 15.4           | 158            | 119             |            |
| Hori.    | 249.839            | QP       | 37.8              | 17.6               | 9.2          | 31.7         | 32.9               | 46.0              | 13.1           | 130            | 116             |            |
| Hori.    | 324.010            | QP       | 41.7              | 14.7               | 6.7          | 31.8         | 31.3               | 46.0              | 14.7           | 120            | 354             |            |
| Hori.    | 1426.445           | PK       | 49.1              | 24.8               | 12.6         | 40.0         | 46.5               | 73.9              | 27.4           | 110            | 221             |            |
| Hori.    | 1626.653           | PK       | 47.0              | 25.6               | 12.7         | 40.1         | 45.2               | 73.9              | 28.7           | 124            | 199             |            |
| Hori.    | 3253.340           | PK       | 46.9              | 29.3               | 4.8          | 41.1         | 39.9               | 73.9              | 34.0           | 164            | 336             |            |
| Hori.    | 4882.000           | PK       | 55.5              | 31.7               | 5.6          | 40.0         | 52.8               | 73.9              | 21.1           | 104            | 120             |            |
| Hori.    | 7323.000           | PK       | 44.8              | 36.7               | 6.9          | 38.5         | 49.9               | 73.9              | 24.0           | 100            | 0               |            |
| Hori.    | 9764.000           | PK       | 43.8              | 38.2               | 7.8          | 37.4         | 52.4               | 73.9              | 21.5           | 100            | 0               |            |
| Hori.    | 12205.000          | PK       | 44.9              | 39.2               | 9.1          | 38.1         | 55.1               | 73.9              | 18.8           | 100            | 0               |            |
| Hori.    | 1426.445           | AV       | 43.4              | 24.8               | 12.6         | 40.0         | 40.8               | 53.9              | 13.1           | 110            | 221             | VBW = 10Hz |
| Hori.    | 1626.653           | AV       | 34.0              | 25.6               | 12.7         | 40.1         | 32.2               | 53.9              | 21.7           | 124            | 199             | VBW = 10Hz |
| Hori.    | 3253.340           | AV       | 34.5              | 29.3               | 4.8          | 41.1         | 27.5               | 53.9              | 26.4           | 164            | 336             | VBW = 10Hz |
| Vert.    | 76.582             | QP       | 37.9              | 6.6                | 7.6          | 31.8         | 20.3               | 40.0              | 19.7           | 100            | 212             |            |
| Vert.    | 173.279            | QP       | 39.5              | 16.0               | 8.6          | 31.8         | 32.3               | 43.5              | 11.2           | 100            | 38              |            |
| Vert.    | 590.179            | QP       | 38.7              | 19.0               | 8.4          | 32.0         | 34.1               | 46.0              | 11.9           | 100            | 134             |            |
| Vert.    | 1426.445           | PK       | 50.1              | 24.8               | 12.6         | 40.0         | 47.5               | 73.9              | 26.4           | 100            | 0               |            |
| Vert.    | 1626.653           | PK       | 48.5              | 25.6               | 12.7         | 40.1         | 46.7               | 73.9              | 27.2           | 124            | 166             |            |
| Vert.    | 3253.340           | PK       | 49.5              | 29.3               | 4.8          | 41.1         | 42.5               | 73.9              | 31.4           | 185            | 5               |            |
| Vert.    | 4882.000           | PK       | 56.6              | 31.7               | 5.6          | 40.0         | 53.9               | 73.9              | 20.0           | 103            | 358             |            |
| Vert.    | 7323.000           | PK       | 44.8              | 36.7               | 6.9          | 38.5         | 49.9               | 73.9              | 24.0           | 100            | 0               |            |
| Vert.    | 9764.000           | PK       | 43.3              | 38.2               | 7.8          | 37.4         | 51.9               | 73.9              | 22.0           | 100            | 0               |            |
| Vert.    | 12205.000          | PK       | 44.5              | 39.2               | 9.1          | 38.1         | 54.7               | 73.9              | 19.2           | 100            | 0               |            |
| Vert.    | 1426.445           | AV       | 42.5              | 24.8               | 12.6         | 40.0         | 39.9               | 53.9              | 14.0           | 100            | 0               | VBW = 10Hz |
| Vert.    | 1626.653           | AV       | 37.1              | 25.6               | 12.7         | 40.1         | 35.3               | 53.9              | 18.6           | 124            | 166             | VBW = 10Hz |
| Vert.    | 3253.340           | AV       | 37.5              | 29.3               | 4.8          | 41.1         | 30.5               | 53.9              | 23.4           | 185            | 5               | VBW = 10Hz |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

### Dwell time factor relaxation

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant<br>Factor<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Dwell<br>Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|-------------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 4882.000           | AV       | 48.1              | 31.7                    | 5.6          | 40.0         | -24.7                   | 20.7               | 54.0              | 33.3           | VBW = 300Hz |
| Hori.    | 7323.000           | AV       | 32.7              | 36.7                    | 6.9          | 38.5         | -24.7                   | 13.1               | 54.0              | 40.9           | VBW = 300Hz |
| Hori.    | 9764.000           | AV       | 31.5              | 38.2                    | 7.8          | 37.4         | -24.7                   | 15.4               | 54.0              | 38.6           | VBW = 300Hz |
| Hori.    | 12205.000          | AV       | 32.4              | 39.2                    | 9.1          | 38.1         | -24.7                   | 17.9               | 54.0              | 36.1           | VBW = 300Hz |
| Vert.    | 4882.000           | AV       | 48.2              | 31.7                    | 5.6          | 40.0         | -24.7                   | 20.8               | 54.0              | 33.2           | VBW = 300Hz |
| Vert.    | 7323.000           | AV       | 32.7              | 36.7                    | 6.9          | 38.5         | -24.7                   | 13.1               | 54.0              | 40.9           | VBW = 300Hz |
| Vert.    | 9764.000           | AV       | 31.6              | 38.2                    | 7.8          | 37.4         | -24.7                   | 15.5               | 54.0              | 38.5           | VBW = 300Hz |
| Vert.    | 12205.000          | AV       | 38.4              | 39.2                    | 9.1          | 38.1         | -24.7                   | 23.9               | 54.0              | 30.1           | VBW = 300Hz |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter)

- Gain(Amplifier) + Dwell time factor (Refer to Duty Fctor data)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

\*No noise was detected above the 5th order harmonics.

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## Radiated Emission

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.1 Semi Anechoic Chamber / No.3 Semi Anechoic Chamber  
Date                              2010/11/1                              2010/11/3  
Temperature / Humidity      23deg.C. , 58%                      23deg.C. , 40%  
Engineer                        Tatsuya Arai                              Akio Hayashi  
Mode                              Tx,                              2480 MHz  
                                         Bluetooth, DHS

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg.] | Remark     |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------------|-------------------|----------------|----------------|-----------------|------------|
| Hori.    | 81.975             | QP       | 41.4              | 6.9                | 7.6          | 31.8         | 24.1               | 40.0              | 15.9           | 400            | 132             |            |
| Hori.    | 173.282            | QP       | 42.1              | 16.0               | 8.6          | 31.8         | 34.9               | 43.5              | 8.6            | 182            | 133             |            |
| Hori.    | 216.002            | QP       | 36.2              | 17.1               | 8.9          | 31.7         | 30.5               | 46.0              | 15.5           | 160            | 117             |            |
| Hori.    | 249.674            | QP       | 37.7              | 17.6               | 9.2          | 31.7         | 32.8               | 46.0              | 13.2           | 130            | 107             |            |
| Hori.    | 324.011            | QP       | 41.7              | 14.7               | 6.7          | 31.8         | 31.3               | 46.0              | 14.7           | 120            | 356             |            |
| Hori.    | 1426.470           | PK       | 50.7              | 24.8               | 12.6         | 40.0         | 48.1               | 73.9              | 25.8           | 116            | 166             |            |
| Hori.    | 1652.632           | PK       | 49.8              | 25.7               | 12.8         | 40.2         | 48.1               | 73.9              | 25.8           | 110            | 133             |            |
| Hori.    | 2483.500           | PK       | 46.3              | 27.6               | 13.4         | 40.1         | 47.2               | 73.9              | 26.7           | 111            | 341             |            |
| Hori.    | 3305.318           | PK       | 49.3              | 29.3               | 4.9          | 41.1         | 42.4               | 73.9              | 31.5           | 154            | 48              |            |
| Hori.    | 4960.000           | PK       | 55.5              | 31.9               | 5.6          | 40.0         | 53.0               | 73.9              | 20.9           | 111            | 147             |            |
| Hori.    | 7440.000           | PK       | 45.2              | 36.9               | 7.1          | 38.7         | 50.5               | 73.9              | 23.4           | 100            | 0               |            |
| Hori.    | 9920.000           | PK       | 42.7              | 38.4               | 8.0          | 37.5         | 51.6               | 73.9              | 22.3           | 100            | 0               |            |
| Hori.    | 12400.000          | PK       | 43.6              | 39.1               | 9.4          | 37.9         | 54.2               | 73.9              | 19.7           | 100            | 0               |            |
| Hori.    | 1426.470           | AV       | 43.5              | 24.8               | 12.6         | 40.0         | 40.9               | 53.9              | 13.0           | 116            | 166             | VBW = 10Hz |
| Hori.    | 1652.632           | AV       | 37.6              | 25.7               | 12.8         | 40.2         | 35.9               | 53.9              | 18.0           | 110            | 133             | VBW = 10Hz |
| Hori.    | 3305.318           | AV       | 37.7              | 29.3               | 4.9          | 41.1         | 30.8               | 53.9              | 23.1           | 154            | 48              | VBW = 10Hz |
| Vert.    | 77.250             | QP       | 37.7              | 6.6                | 7.6          | 31.8         | 20.1               | 40.0              | 19.9           | 100            | 192             |            |
| Vert.    | 173.269            | QP       | 40.0              | 16.0               | 8.6          | 31.8         | 32.8               | 43.5              | 10.7           | 100            | 30              |            |
| Vert.    | 590.075            | QP       | 39.0              | 19.0               | 8.4          | 32.0         | 34.4               | 46.0              | 11.6           | 100            | 113             |            |
| Vert.    | 1426.470           | PK       | 50.9              | 24.8               | 12.6         | 40.0         | 48.3               | 73.9              | 25.6           | 108            | 230             |            |
| Vert.    | 1652.632           | PK       | 50.1              | 25.7               | 12.8         | 40.2         | 48.4               | 73.9              | 25.5           | 118            | 7               |            |
| Vert.    | 2483.500           | PK       | 47.3              | 27.6               | 13.4         | 40.1         | 48.2               | 73.9              | 25.7           | 114            | 151             |            |
| Vert.    | 3305.318           | PK       | 48.9              | 29.3               | 4.9          | 41.1         | 42.0               | 73.9              | 31.9           | 155            | 232             |            |
| Vert.    | 4960.000           | PK       | 57.6              | 31.9               | 5.6          | 40.0         | 55.1               | 73.9              | 18.8           | 129            | 28              |            |
| Vert.    | 7440.000           | PK       | 44.8              | 36.9               | 7.1          | 38.7         | 50.1               | 73.9              | 23.8           | 100            | 0               |            |
| Vert.    | 9920.000           | PK       | 42.7              | 38.4               | 8.0          | 37.5         | 51.6               | 73.9              | 22.3           | 100            | 0               |            |
| Vert.    | 12400.000          | PK       | 43.2              | 39.1               | 9.4          | 37.9         | 53.8               | 73.9              | 20.1           | 100            | 0               |            |
| Vert.    | 1426.470           | AV       | 43.6              | 24.8               | 12.6         | 40.0         | 41.0               | 53.9              | 12.9           | 108            | 230             | VBW = 10Hz |
| Vert.    | 1652.632           | AV       | 40.6              | 25.7               | 12.8         | 40.2         | 38.9               | 53.9              | 15.0           | 118            | 7               | VBW = 10Hz |
| Vert.    | 3305.318           | AV       | 37.1              | 29.3               | 4.9          | 41.1         | 30.2               | 53.9              | 23.7           | 155            | 232             | VBW = 10Hz |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

### Dwell time factor relaxation

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant<br>Factor<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Dwell<br>Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|-------------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 2483.500           | AV       | 36.9              | 27.6                    | 13.4         | 40.1         | -24.7                   | 13.1               | 54.0              | 40.9           | VBW = 300Hz |
| Hori.    | 4960.000           | AV       | 50.3              | 31.9                    | 5.6          | 40.0         | -24.7                   | 23.1               | 54.0              | 30.9           | VBW = 300Hz |
| Hori.    | 7440.000           | AV       | 34.3              | 36.9                    | 7.1          | 38.7         | -24.7                   | 14.9               | 54.0              | 39.1           | VBW = 300Hz |
| Hori.    | 9920.000           | AV       | 31.6              | 38.4                    | 8.0          | 37.5         | -24.7                   | 15.8               | 54.0              | 38.2           | VBW = 300Hz |
| Hori.    | 12400.000          | AV       | 32.3              | 39.1                    | 9.4          | 37.9         | -24.7                   | 18.2               | 54.0              | 35.8           | VBW = 300Hz |
| Vert.    | 2483.500           | AV       | 36.8              | 27.6                    | 13.4         | 40.1         | -24.7                   | 13.0               | 54.0              | 41.0           | VBW = 300Hz |
| Vert.    | 4960.000           | AV       | 50.3              | 31.9                    | 5.6          | 40.0         | -24.7                   | 23.1               | 54.0              | 30.9           | VBW = 300Hz |
| Vert.    | 7440.000           | AV       | 34.3              | 36.9                    | 7.1          | 38.7         | -24.7                   | 14.9               | 54.0              | 39.1           | VBW = 300Hz |
| Vert.    | 9920.000           | AV       | 31.6              | 38.4                    | 8.0          | 37.5         | -24.7                   | 15.8               | 54.0              | 38.2           | VBW = 300Hz |
| Vert.    | 12400.000          | AV       | 32.2              | 39.1                    | 9.4          | 37.9         | -24.7                   | 18.1               | 54.0              | 35.9           | VBW = 300Hz |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter)

- Gain(Amplifier) + Dwell time factor (Refer to Duty Factor data)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

\*No noise was detected above the 5th order harmonics.

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## Radiated Emission

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.1 Semi Anechoic Chamber / No.3 Semi Anechoic Chamber  
Date                              2010/11/1                              2010/11/3  
Temperature / Humidity      23deg.C. , 58%                      23deg.C. , 40%  
Engineer                        Tatsuya Arai                              Akio Hayashi  
Mode                              Tx,                              2402 MHz  
                                         Bluetooth, 3-DH5

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg.] | Remark     |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------------|-------------------|----------------|----------------|-----------------|------------|
| Hori.    | 78.612             | QP       | 43.4              | 6.5                | 7.6          | 31.8         | 25.7               | 40.0              | 14.3           | 253            | 136             |            |
| Hori.    | 173.262            | QP       | 41.3              | 16.0               | 8.6          | 31.8         | 34.1               | 43.5              | 9.4            | 190            | 156             |            |
| Hori.    | 216.002            | QP       | 36.5              | 17.1               | 8.9          | 31.7         | 30.8               | 46.0              | 15.2           | 173            | 121             |            |
| Hori.    | 249.833            | QP       | 38.5              | 17.6               | 9.2          | 31.7         | 33.6               | 46.0              | 12.4           | 140            | 99              |            |
| Hori.    | 324.020            | QP       | 41.4              | 14.7               | 6.7          | 31.8         | 31.0               | 46.0              | 15.0           | 100            | 350             |            |
| Hori.    | 1426.402           | PK       | 51.4              | 24.8               | 12.6         | 40.0         | 48.8               | 73.9              | 25.1           | 109            | 237             |            |
| Hori.    | 1602.008           | PK       | 51.1              | 25.5               | 12.7         | 40.1         | 49.2               | 73.9              | 24.7           | 107            | 41              |            |
| Hori.    | 2390.000           | PK       | 48.5              | 27.5               | 13.3         | 40.2         | 49.1               | 73.9              | 24.8           | 156            | 147             |            |
| Hori.    | 2399.591           | PK       | 50.9              | 27.5               | 13.3         | 40.2         | 51.5               | 73.9              | 22.4           | 156            | 147             |            |
| Hori.    | 2400.000           | PK       | 58.8              | 27.5               | 13.3         | 40.2         | 59.4               | 73.9              | 14.5           | 156            | 147             |            |
| Hori.    | 3203.987           | PK       | 53.8              | 29.2               | 4.9          | 41.1         | 46.8               | 73.9              | 27.1           | 101            | 1               |            |
| Hori.    | 4802.000           | PK       | 52.9              | 31.5               | 5.5          | 40.1         | 49.8               | 73.9              | 24.1           | 124            | 159             |            |
| Hori.    | 7206.000           | PK       | 51.7              | 36.4               | 6.7          | 38.3         | 56.5               | 73.9              | 17.4           | 100            | 0               |            |
| Hori.    | 9608.000           | PK       | 49.0              | 37.9               | 7.8          | 37.3         | 57.4               | 73.9              | 16.5           | 100            | 0               |            |
| Hori.    | 12010.000          | PK       | 51.3              | 39.4               | 9.0          | 38.4         | 61.3               | 73.9              | 12.6           | 100            | 0               |            |
| Hori.    | 1426.402           | AV       | 42.6              | 24.8               | 12.6         | 40.0         | 40.0               | 53.9              | 13.9           | 109            | 237             | VBW = 10Hz |
| Hori.    | 1602.008           | AV       | 37.5              | 25.5               | 12.7         | 40.1         | 35.6               | 53.9              | 18.3           | 107            | 41              | VBW = 10Hz |
| Hori.    | 3203.987           | AV       | 40.5              | 29.2               | 4.9          | 41.1         | 33.5               | 53.9              | 20.4           | 101            | 1               | VBW = 10Hz |
| Vert.    | 81.300             | QP       | 37.6              | 6.8                | 7.6          | 31.8         | 20.2               | 40.0              | 19.8           | 100            | 232             |            |
| Vert.    | 173.264            | QP       | 39.6              | 16.0               | 8.6          | 31.8         | 32.4               | 43.5              | 11.1           | 100            | 30              |            |
| Vert.    | 590.095            | QP       | 38.9              | 19.0               | 8.4          | 32.0         | 34.3               | 46.0              | 11.7           | 100            | 127             |            |
| Vert.    | 1426.402           | PK       | 51.5              | 24.8               | 12.6         | 40.0         | 48.9               | 73.9              | 25.0           | 121            | 165             |            |
| Vert.    | 1602.008           | PK       | 50.0              | 25.5               | 12.7         | 40.1         | 48.1               | 73.9              | 25.8           | 100            | 198             |            |
| Vert.    | 2390.000           | PK       | 49.0              | 27.5               | 13.3         | 40.2         | 49.6               | 73.9              | 24.3           | 100            | 0               |            |
| Vert.    | 2399.591           | PK       | 50.2              | 27.5               | 13.3         | 40.2         | 50.8               | 73.9              | 23.1           | 110            | 209             |            |
| Vert.    | 2400.000           | PK       | 56.1              | 27.5               | 13.3         | 40.2         | 56.7               | 73.9              | 17.2           | 110            | 209             |            |
| Vert.    | 3203.987           | PK       | 48.8              | 29.2               | 4.9          | 41.1         | 41.8               | 73.9              | 32.1           | 110            | 219             |            |
| Vert.    | 4802.000           | PK       | 52.0              | 31.5               | 5.5          | 40.1         | 48.9               | 73.9              | 25.0           | 115            | 187             |            |
| Vert.    | 7206.000           | PK       | 51.6              | 36.4               | 6.7          | 38.3         | 56.4               | 73.9              | 17.5           | 100            | 0               |            |
| Vert.    | 9608.000           | PK       | 49.4              | 37.9               | 7.8          | 37.3         | 57.8               | 73.9              | 16.1           | 100            | 0               |            |
| Vert.    | 12010.000          | PK       | 51.5              | 39.4               | 9.0          | 38.4         | 61.5               | 73.9              | 12.4           | 100            | 0               |            |
| Vert.    | 1426.402           | AV       | 43.4              | 24.8               | 12.6         | 40.0         | 40.8               | 53.9              | 13.1           | 121            | 165             | VBW = 10Hz |
| Vert.    | 1602.008           | AV       | 37.9              | 25.5               | 12.7         | 40.1         | 36.0               | 53.9              | 17.9           | 100            | 198             | VBW = 10Hz |
| Vert.    | 3203.987           | AV       | 36.7              | 29.2               | 4.9          | 41.1         | 29.7               | 53.9              | 24.2           | 110            | 219             | VBW = 10Hz |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

### Dwell time factor relaxation

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant<br>Factor<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Dwell<br>Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|-------------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 2390.000           | AV       | 35.7              | 27.5                    | 13.3         | 40.2         | -24.7                   | 11.6               | 54.0              | 42.4           | VBW = 300Hz |
| Hori.    | 2399.591           | AV       | 39.5              | 27.5                    | 13.3         | 40.2         | -24.7                   | 15.4               | 54.0              | 38.6           | VBW = 300Hz |
| Hori.    | 2400.000           | AV       | 45.5              | 27.5                    | 13.3         | 40.2         | -24.7                   | 21.4               | 54.0              | 32.6           | VBW = 300Hz |
| Hori.    | 4802.000           | AV       | 41.0              | 31.5                    | 5.5          | 40.1         | -24.7                   | 13.2               | 54.0              | 40.8           | VBW = 300Hz |
| Hori.    | 7206.000           | AV       | 38.8              | 36.4                    | 6.7          | 38.3         | -24.7                   | 18.9               | 54.0              | 35.1           | VBW = 300Hz |
| Hori.    | 9608.000           | AV       | 36.4              | 37.9                    | 7.8          | 37.3         | -24.7                   | 20.1               | 54.0              | 33.9           | VBW = 300Hz |
| Hori.    | 12010.000          | AV       | 38.7              | 39.4                    | 9.0          | 38.4         | -24.7                   | 24.0               | 54.0              | 30.0           | VBW = 300Hz |
| Vert.    | 2390.000           | AV       | 35.7              | 27.5                    | 13.3         | 40.2         | -24.7                   | 11.6               | 54.0              | 42.4           | VBW = 300Hz |
| Vert.    | 2399.591           | AV       | 37.9              | 27.5                    | 13.3         | 40.2         | -24.7                   | 13.8               | 54.0              | 40.2           | VBW = 300Hz |
| Vert.    | 2400.000           | AV       | 42.6              | 27.5                    | 13.3         | 40.2         | -24.7                   | 18.5               | 54.0              | 35.5           | VBW = 300Hz |
| Vert.    | 4802.000           | AV       | 39.5              | 31.5                    | 5.5          | 40.1         | -24.7                   | 11.7               | 54.0              | 42.3           | VBW = 300Hz |
| Vert.    | 7206.000           | AV       | 38.8              | 36.4                    | 6.7          | 38.3         | -24.7                   | 18.9               | 54.0              | 35.1           | VBW = 300Hz |
| Vert.    | 9608.000           | AV       | 36.3              | 37.9                    | 7.8          | 37.3         | -24.7                   | 20.0               | 54.0              | 34.0           | VBW = 300Hz |
| Vert.    | 12010.000          | AV       | 38.7              | 39.4                    | 9.0          | 38.4         | -24.7                   | 24.0               | 54.0              | 30.0           | VBW = 300Hz |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter)

- Gain(Amplifier) + Dwell time factor (Refer to Duty Fctor data)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

\*No noise was detected above the 5th order harmonics.

**UL Japan, Inc.**

**Shonan EMC Lab.**

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## Radiated Emission

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.1 Semi Anechoic Chamber / No.3 Semi Anechoic Chamber  
Date                              2010/11/1                              2010/11/3  
Temperature / Humidity      23deg.C. , 58%                      23deg.C. , 40%  
Engineer                        Tatsuya Arai                              Akio Hayashi  
Mode                              Tx,                              2441 MHz  
                                         Bluetooth, 3-DH5

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg.] | Remark     |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------------|-------------------|----------------|----------------|-----------------|------------|
| Hori.    | 84.651             | QP       | 41.8              | 7.4                | 7.7          | 31.8         | 25.1               | 40.0              | 14.9           | 196            | 146             |            |
| Hori.    | 173.269            | QP       | 42.0              | 16.0               | 8.6          | 31.8         | 34.8               | 43.5              | 8.7            | 180            | 135             |            |
| Hori.    | 216.008            | QP       | 36.5              | 17.1               | 8.9          | 31.7         | 30.8               | 46.0              | 15.2           | 162            | 117             |            |
| Hori.    | 249.888            | QP       | 38.0              | 17.6               | 9.2          | 31.7         | 33.1               | 46.0              | 12.9           | 133            | 96              |            |
| Hori.    | 324.018            | QP       | 41.1              | 14.7               | 6.7          | 31.8         | 30.7               | 46.0              | 15.3           | 100            | 344             |            |
| Hori.    | 1426.440           | PK       | 52.0              | 24.8               | 12.6         | 40.0         | 49.4               | 73.9              | 24.5           | 107            | 219             |            |
| Hori.    | 1626.683           | PK       | 50.6              | 25.6               | 12.7         | 40.1         | 48.8               | 73.9              | 25.1           | 100            | 0               |            |
| Hori.    | 3253.328           | PK       | 48.1              | 29.3               | 4.8          | 41.1         | 41.1               | 73.9              | 32.8           | 136            | 47              |            |
| Hori.    | 4882.000           | PK       | 50.6              | 31.7               | 5.6          | 40.0         | 47.9               | 73.9              | 26.0           | 100            | 22              |            |
| Hori.    | 7323.000           | PK       | 46.0              | 36.7               | 6.9          | 38.5         | 51.1               | 73.9              | 22.8           | 100            | 0               |            |
| Hori.    | 9764.000           | PK       | 44.2              | 38.2               | 7.8          | 37.4         | 52.8               | 73.9              | 21.1           | 100            | 0               |            |
| Hori.    | 12205.000          | PK       | 44.3              | 39.2               | 9.1          | 38.1         | 54.5               | 73.9              | 19.4           | 100            | 0               |            |
| Hori.    | 1426.440           | AV       | 44.0              | 24.8               | 12.6         | 40.0         | 41.4               | 53.9              | 12.5           | 107            | 219             | VBW = 10Hz |
| Hori.    | 1626.683           | AV       | 38.6              | 25.6               | 12.7         | 40.1         | 36.8               | 53.9              | 17.1           | 100            | 0               | VBW = 10Hz |
| Hori.    | 3253.328           | AV       | 35.1              | 29.3               | 4.8          | 41.1         | 28.1               | 53.9              | 25.8           | 136            | 47              | VBW = 10Hz |
| Vert.    | 79.819             | QP       | 37.8              | 6.5                | 7.6          | 31.8         | 20.1               | 40.0              | 19.9           | 100            | 36              |            |
| Vert.    | 173.251            | QP       | 39.4              | 16.0               | 8.6          | 31.8         | 32.2               | 43.5              | 11.3           | 100            | 38              |            |
| Vert.    | 585.241            | QP       | 38.2              | 18.9               | 8.3          | 32.0         | 33.4               | 46.0              | 12.6           | 100            | 125             |            |
| Vert.    | 1426.440           | PK       | 51.3              | 24.8               | 12.6         | 40.0         | 48.7               | 73.9              | 25.2           | 100            | 328             |            |
| Vert.    | 1626.683           | PK       | 50.5              | 25.6               | 12.7         | 40.1         | 48.7               | 73.9              | 25.2           | 100            | 202             |            |
| Vert.    | 3253.328           | PK       | 48.9              | 29.3               | 4.8          | 41.1         | 41.9               | 73.9              | 32.0           | 139            | 0               |            |
| Vert.    | 4882.000           | PK       | 52.7              | 31.7               | 5.6          | 40.0         | 50.0               | 73.9              | 23.9           | 103            | 358             |            |
| Vert.    | 7323.000           | PK       | 45.9              | 36.7               | 6.9          | 38.5         | 51.0               | 73.9              | 22.9           | 100            | 0               |            |
| Vert.    | 9764.000           | PK       | 44.2              | 38.2               | 7.8          | 37.4         | 52.8               | 73.9              | 21.1           | 100            | 0               |            |
| Vert.    | 12205.000          | PK       | 45.5              | 39.2               | 9.1          | 38.1         | 55.7               | 73.9              | 18.2           | 100            | 0               |            |
| Vert.    | 1426.440           | AV       | 42.5              | 24.8               | 12.6         | 40.0         | 39.9               | 53.9              | 14.0           | 100            | 328             | VBW = 10Hz |
| Vert.    | 1626.683           | AV       | 39.8              | 25.6               | 12.7         | 40.1         | 38.0               | 53.9              | 15.9           | 100            | 202             | VBW = 10Hz |
| Vert.    | 3253.328           | AV       | 39.6              | 29.3               | 4.8          | 41.1         | 32.6               | 53.9              | 21.3           | 139            | 0               | VBW = 10Hz |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

### Dwell time factor relaxation

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant<br>Factor<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Dwell<br>Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|-------------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 4882.000           | AV       | 39.4              | 31.7                    | 5.6          | 40.0         | -24.7                   | 12.0               | 54.0              | 42.0           | VBW = 300Hz |
| Hori.    | 7323.000           | AV       | 31.5              | 36.7                    | 6.9          | 38.5         | -24.7                   | 11.9               | 54.0              | 42.1           | VBW = 300Hz |
| Hori.    | 9764.000           | AV       | 30.1              | 38.2                    | 7.8          | 37.4         | -24.7                   | 14.0               | 54.0              | 40.0           | VBW = 300Hz |
| Hori.    | 12205.000          | AV       | 31.5              | 39.2                    | 9.1          | 38.1         | -24.7                   | 17.0               | 54.0              | 37.0           | VBW = 300Hz |
| Vert.    | 4882.000           | AV       | 41.4              | 31.7                    | 5.6          | 40.0         | -24.7                   | 14.0               | 54.0              | 40.0           | VBW = 300Hz |
| Vert.    | 7323.000           | AV       | 31.5              | 36.7                    | 6.9          | 38.5         | -24.7                   | 11.9               | 54.0              | 42.1           | VBW = 300Hz |
| Vert.    | 9764.000           | AV       | 30.1              | 38.2                    | 7.8          | 37.4         | -24.7                   | 14.0               | 54.0              | 40.0           | VBW = 300Hz |
| Vert.    | 12205.000          | AV       | 31.5              | 39.2                    | 9.1          | 38.1         | -24.7                   | 17.0               | 54.0              | 37.0           | VBW = 300Hz |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter)

- Gain(Amplifier) + Dwell time factor (Refer to Duty Fctor data)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

\*No noise was detected above the 5th order harmonics.

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## Radiated Emission

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.1 Semi Anechoic Chamber / No.3 Semi Anechoic Chamber  
Date                              2010/11/1                              2010/11/3  
Temperature / Humidity      23deg.C. , 58%                      23deg.C. , 40%  
Engineer                        Tatsuya Arai                              Akio Hayashi  
Mode                              Tx,                              2480 MHz  
                                         Bluetooth, 3-DH5

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg.] | Remark     |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|--------------------|-------------------|----------------|----------------|-----------------|------------|
| Hori.    | 79.950             | QP       | 40.6              | 6.5                | 7.6          | 31.8         | 22.9               | 40.0              | 17.1           | 196            | 142             |            |
| Hori.    | 173.264            | QP       | 41.8              | 16.0               | 8.6          | 31.8         | 34.6               | 43.5              | 8.9            | 193            | 144             |            |
| Hori.    | 216.300            | QP       | 36.6              | 17.1               | 8.9          | 31.7         | 30.9               | 46.0              | 15.1           | 165            | 115             |            |
| Hori.    | 249.788            | QP       | 38.6              | 17.6               | 9.2          | 31.7         | 33.7               | 46.0              | 12.3           | 136            | 101             |            |
| Hori.    | 324.027            | QP       | 41.3              | 14.7               | 6.7          | 31.8         | 30.9               | 46.0              | 15.1           | 100            | 351             |            |
| Hori.    | 1426.433           | PK       | 49.8              | 24.8               | 12.6         | 40.0         | 47.2               | 73.9              | 26.7           | 112            | 237             |            |
| Hori.    | 1652.500           | PK       | 47.8              | 25.7               | 12.8         | 40.2         | 46.1               | 73.9              | 27.8           | 116            | 133             |            |
| Hori.    | 2483.500           | PK       | 43.3              | 27.6               | 13.4         | 40.1         | 44.2               | 73.9              | 29.7           | 110            | 329             |            |
| Hori.    | 3305.381           | PK       | 50.6              | 29.3               | 4.9          | 41.1         | 43.7               | 73.9              | 30.2           | 100            | 187             |            |
| Hori.    | 4960.000           | PK       | 48.7              | 31.9               | 5.6          | 40.0         | 46.2               | 73.9              | 27.7           | 100            | 150             |            |
| Hori.    | 7440.000           | PK       | 47.7              | 36.9               | 7.1          | 38.7         | 53.0               | 73.9              | 20.9           | 100            | 0               |            |
| Hori.    | 9920.000           | PK       | 44.8              | 38.4               | 8.0          | 37.5         | 53.7               | 73.9              | 20.2           | 100            | 0               |            |
| Hori.    | 12400.000          | PK       | 45.2              | 39.1               | 9.4          | 37.9         | 55.8               | 73.9              | 18.1           | 100            | 0               |            |
| Hori.    | 1426.433           | AV       | 42.9              | 24.8               | 12.6         | 40.0         | 40.3               | 53.9              | 13.6           | 112            | 237             | VBW = 10Hz |
| Hori.    | 1652.500           | AV       | 37.1              | 25.7               | 12.8         | 40.2         | 35.4               | 53.9              | 18.5           | 116            | 133             | VBW = 10Hz |
| Hori.    | 3305.381           | AV       | 38.2              | 29.3               | 4.9          | 41.1         | 31.3               | 53.9              | 22.6           | 100            | 187             | VBW = 10Hz |
| Vert.    | 81.975             | QP       | 38.6              | 6.9                | 7.6          | 31.8         | 21.3               | 40.0              | 18.7           | 100            | 1               |            |
| Vert.    | 173.258            | QP       | 39.8              | 16.0               | 8.6          | 31.8         | 32.6               | 43.5              | 10.9           | 100            | 20              |            |
| Vert.    | 585.250            | QP       | 38.8              | 18.9               | 8.3          | 32.0         | 34.0               | 46.0              | 12.0           | 100            | 107             |            |
| Vert.    | 1426.433           | PK       | 50.4              | 24.8               | 12.6         | 40.0         | 47.8               | 73.9              | 26.1           | 120            | 165             |            |
| Vert.    | 1652.500           | PK       | 49.2              | 25.7               | 12.8         | 40.2         | 47.5               | 73.9              | 26.4           | 124            | 356             |            |
| Vert.    | 2483.500           | PK       | 43.4              | 27.6               | 13.4         | 40.1         | 44.3               | 73.9              | 29.6           | 108            | 345             |            |
| Vert.    | 3305.381           | PK       | 50.7              | 29.3               | 4.9          | 41.1         | 43.8               | 73.9              | 30.1           | 140            | 324             |            |
| Vert.    | 4960.000           | PK       | 48.7              | 31.9               | 5.6          | 40.0         | 46.2               | 73.9              | 27.7           | 114            | 26              |            |
| Vert.    | 7440.000           | PK       | 47.7              | 36.9               | 7.1          | 38.7         | 53.0               | 73.9              | 20.9           | 100            | 0               |            |
| Vert.    | 9920.000           | PK       | 44.4              | 38.4               | 8.0          | 37.5         | 53.3               | 73.9              | 20.6           | 100            | 0               |            |
| Vert.    | 12400.000          | PK       | 45.7              | 39.1               | 9.4          | 37.9         | 56.3               | 73.9              | 17.6           | 100            | 0               |            |
| Vert.    | 1426.433           | AV       | 43.4              | 24.8               | 12.6         | 40.0         | 40.8               | 53.9              | 13.1           | 120            | 165             | VBW = 10Hz |
| Vert.    | 1652.500           | AV       | 40.6              | 25.7               | 12.8         | 40.2         | 38.9               | 53.9              | 15.0           | 124            | 356             | VBW = 10Hz |
| Vert.    | 3305.381           | AV       | 39.9              | 29.3               | 4.9          | 41.1         | 33.0               | 53.9              | 20.9           | 140            | 324             | VBW = 10Hz |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

### Dwell time factor relaxation

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant<br>Factor<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Dwell<br>Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|-------------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 2483.500           | AV       | 34.4              | 27.6                    | 13.4         | 40.1         | -24.7                   | 10.6               | 54.0              | 43.4           | VBW = 300Hz |
| Hori.    | 4960.000           | AV       | 35.8              | 31.9                    | 5.6          | 40.0         | -24.7                   | 8.6                | 54.0              | 45.4           | VBW = 300Hz |
| Hori.    | 7440.000           | AV       | 35.3              | 36.9                    | 7.1          | 38.7         | -24.7                   | 15.9               | 54.0              | 38.1           | VBW = 300Hz |
| Hori.    | 9920.000           | AV       | 32.4              | 38.4                    | 8.0          | 37.5         | -24.7                   | 16.6               | 54.0              | 37.4           | VBW = 300Hz |
| Hori.    | 12400.000          | AV       | 33.0              | 39.1                    | 9.4          | 37.9         | -24.7                   | 18.9               | 54.0              | 35.1           | VBW = 300Hz |
| Vert.    | 2483.500           | AV       | 34.8              | 27.6                    | 13.4         | 40.1         | -24.7                   | 11.0               | 54.0              | 43.0           | VBW = 300Hz |
| Vert.    | 4960.000           | AV       | 39.0              | 31.9                    | 5.6          | 40.0         | -24.7                   | 11.8               | 54.0              | 42.2           | VBW = 300Hz |
| Vert.    | 7440.000           | AV       | 35.3              | 36.9                    | 7.1          | 38.7         | -24.7                   | 15.9               | 54.0              | 38.1           | VBW = 300Hz |
| Vert.    | 9920.000           | AV       | 32.3              | 38.4                    | 8.0          | 37.5         | -24.7                   | 16.5               | 54.0              | 37.5           | VBW = 300Hz |
| Vert.    | 12400.000          | AV       | 33.0              | 39.1                    | 9.4          | 37.9         | -24.7                   | 18.9               | 54.0              | 35.1           | VBW = 300Hz |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter)

- Gain(Amplifier) + Dwell time factor (Refer to Duty Factor data)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

\*No noise was detected above the 5th order harmonics.

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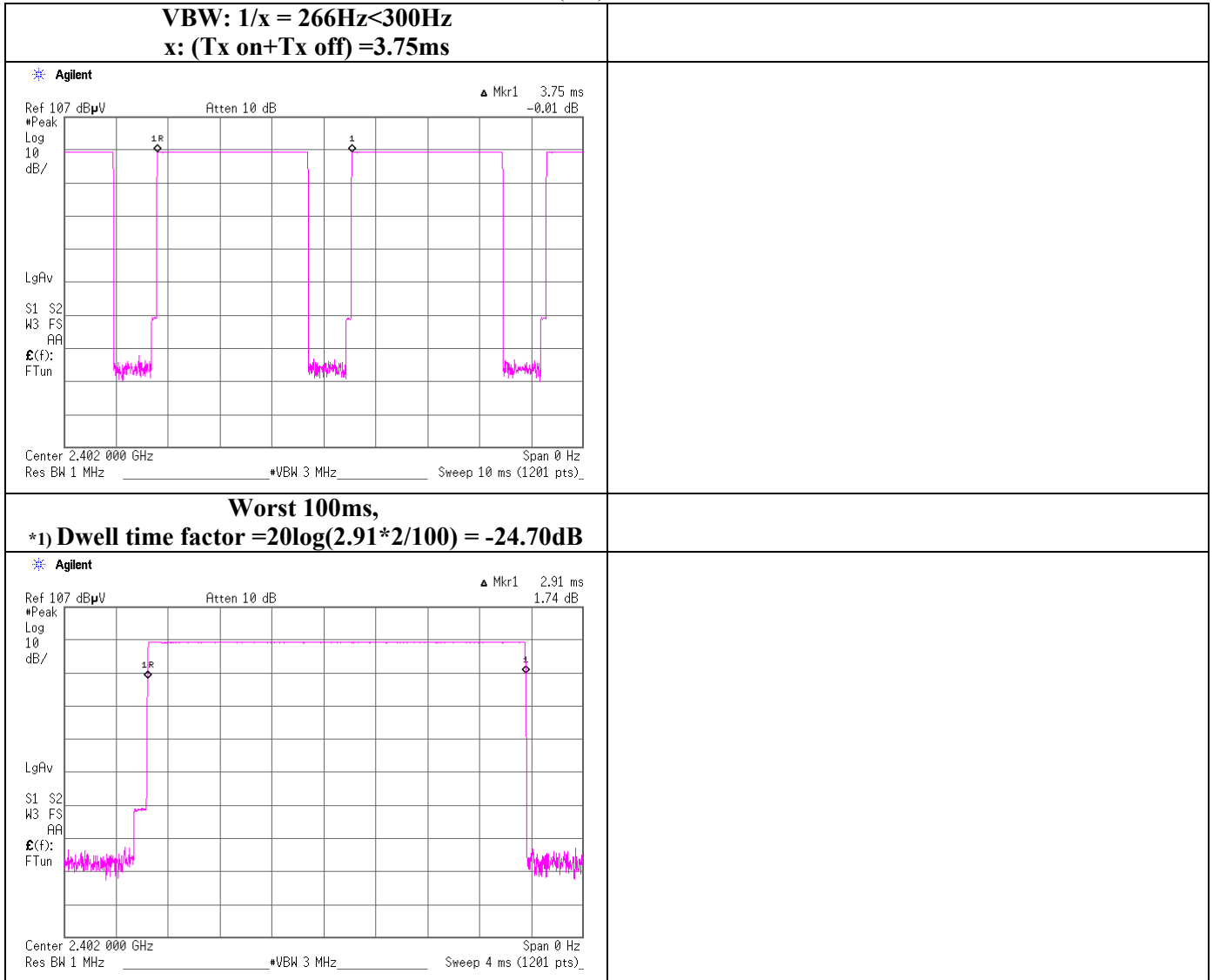
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Facsimile : +81 463 50 6401

## Spurious emission (Radiated)

DH5,

VBW (AV) Calculation



\*1) ON time of some channel during 100ms: Twice  
This is the worst case in hopping sequence of Bluetooth.

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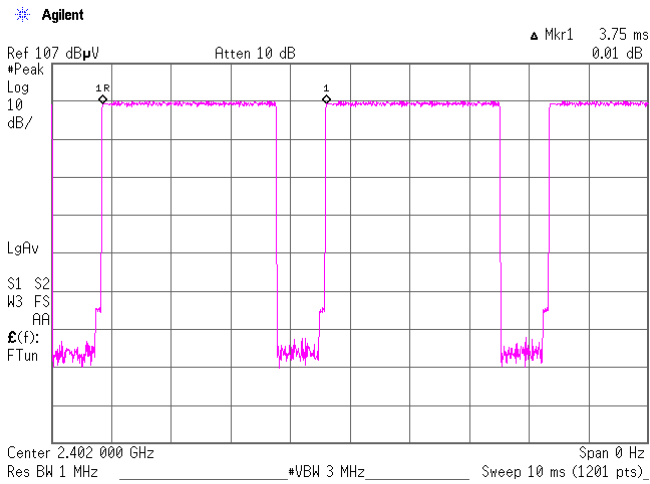
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## Spurious emission (Radiated)

3-DH5,

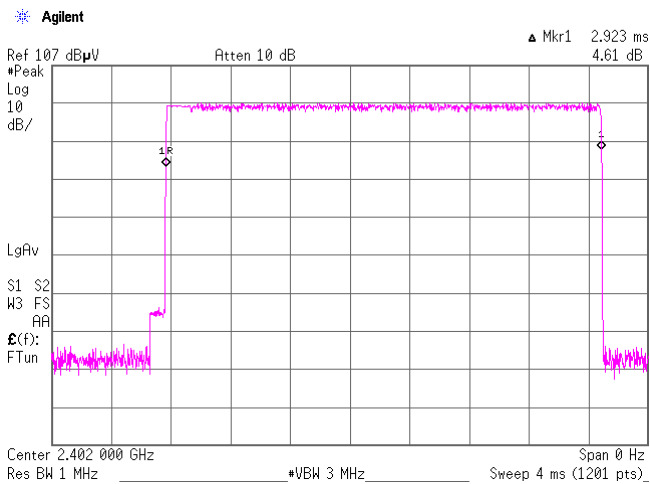
VBW (AV) Calculation

**VBW:  $1/x = 266\text{Hz} < 300\text{Hz}$   
x: (Tx on+Tx off) = 3.75ms**



**Worst 100ms,**

**\*1) Dwell time factor =  $20\log(2.923*2/100) = -24.66\text{dB}$**



\*1) ON time of some channel during 100ms: Twice  
This is the worst case in hopping sequence of Bluetooth.

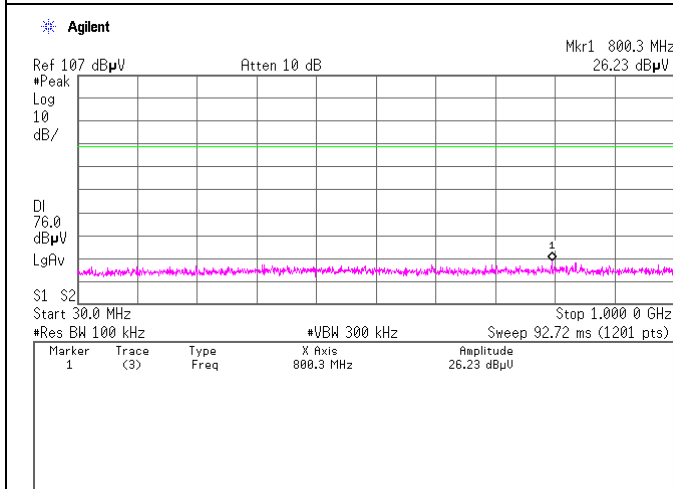
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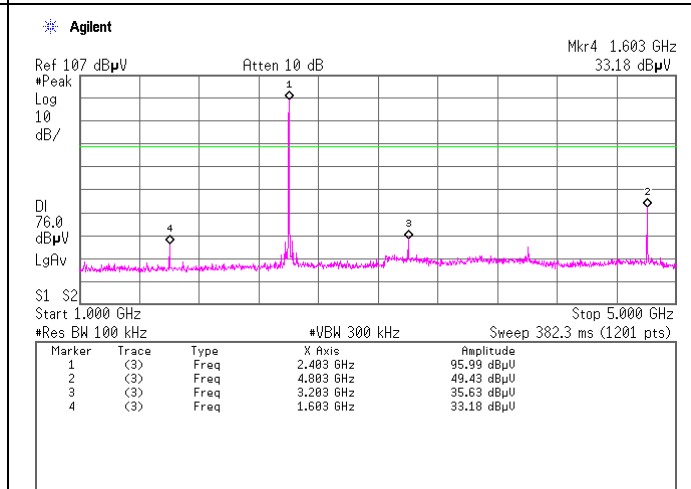
## Spurious emission (Conducted)

DH5,  
Tx, 2402MHz

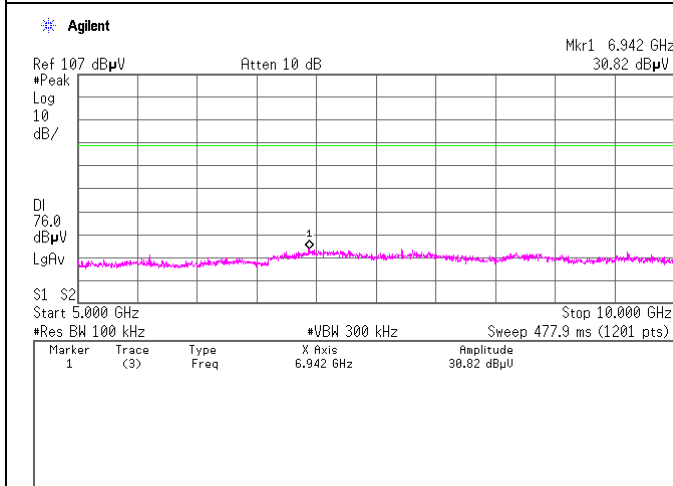
### 30MHz - 1GHz



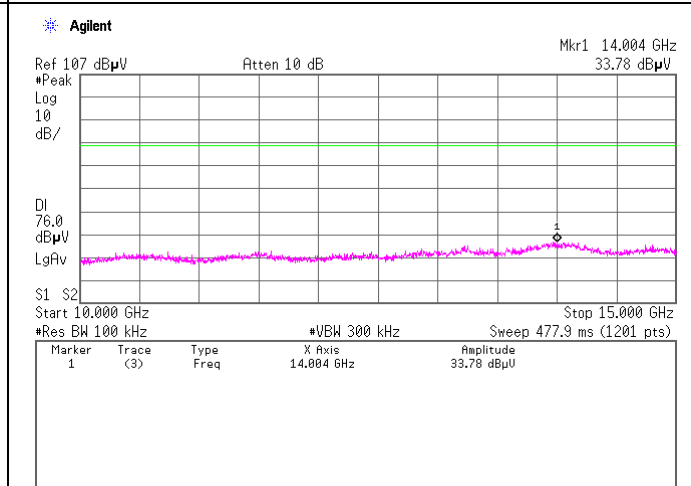
### 1GHz - 5GHz



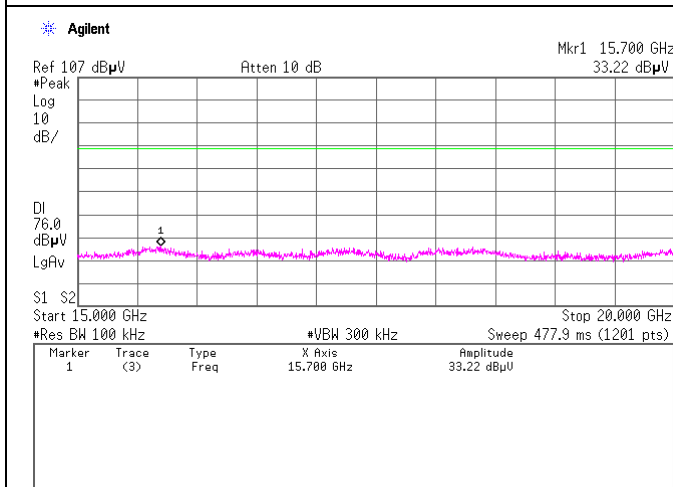
### 5GHz - 10GHz



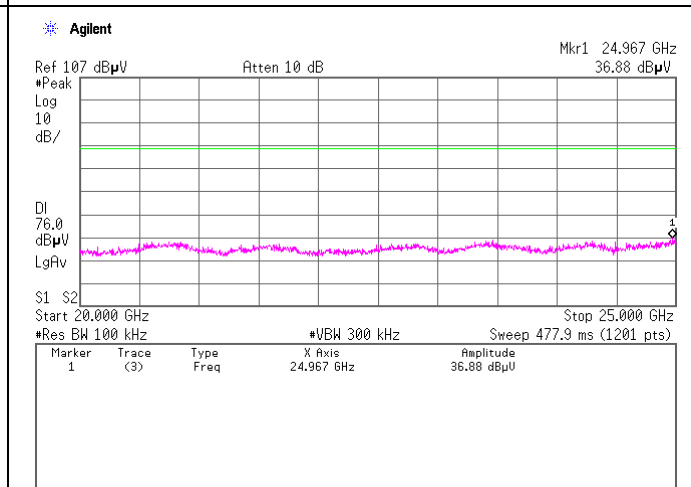
### 10GHz - 15GHz



### 15GHz - 20GHz



### 20GHz - 25GHz



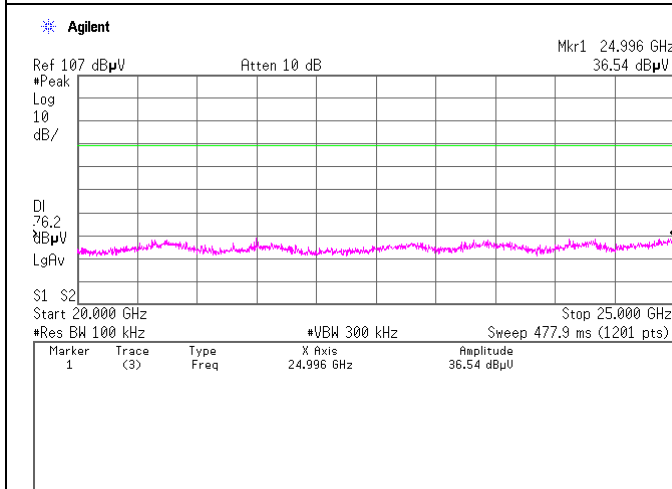
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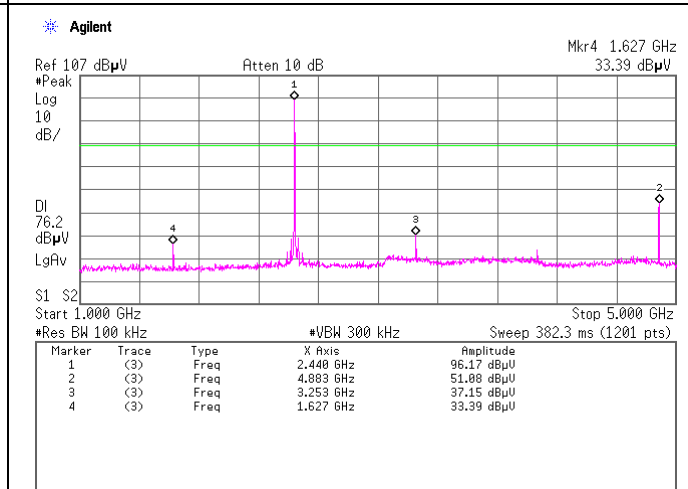
## Spurious emission (Conducted)

DH5,  
Tx, 2441MHz

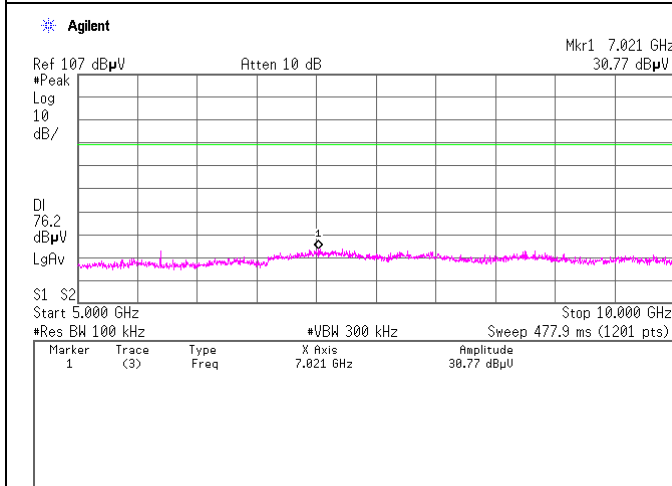
### 30MHz - 1GHz



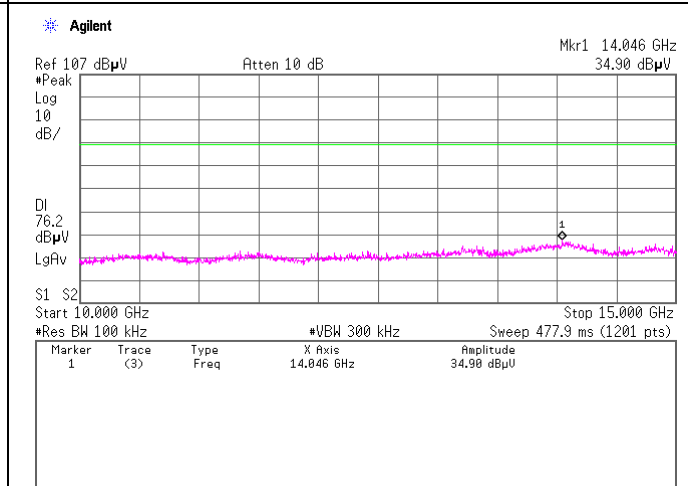
### 1GHz - 5GHz



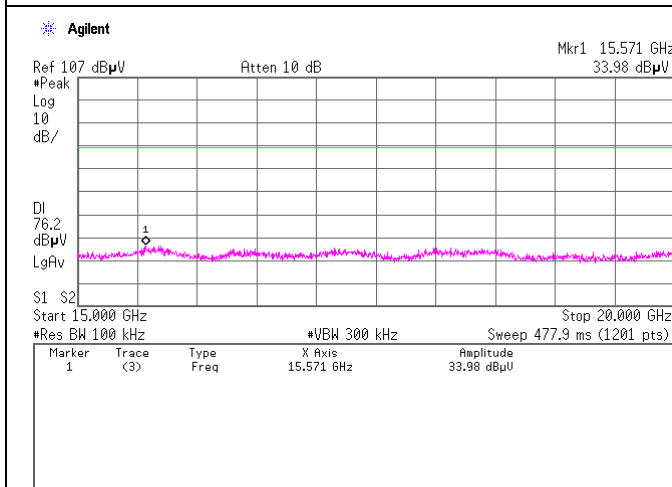
### 5GHz - 10GHz



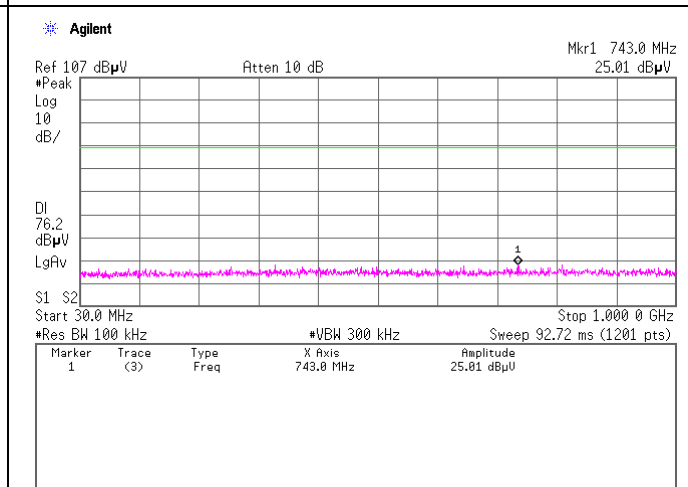
### 10GHz - 15GHz



### 15GHz - 20GHz



### 20GHz - 25GHz



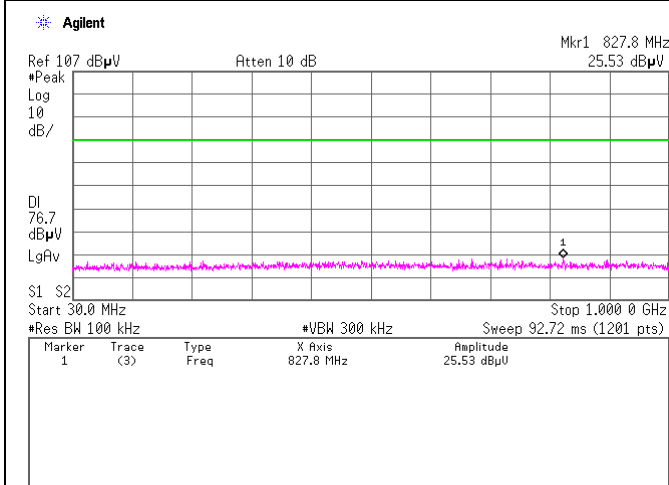
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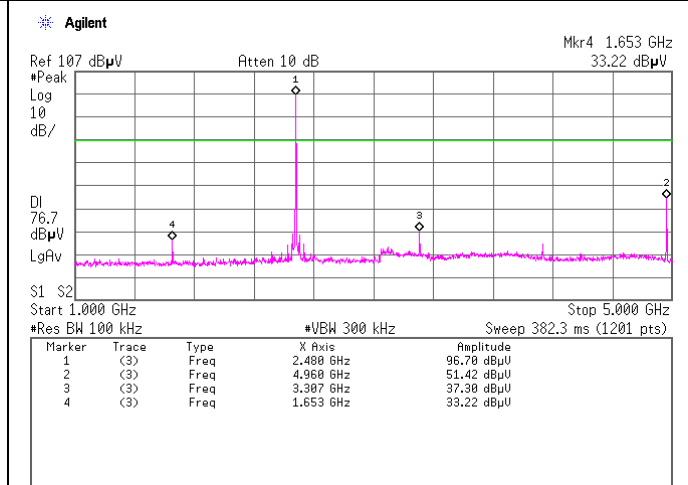
## Spurious emission (Conducted)

DH5,  
Tx, 2480MHz

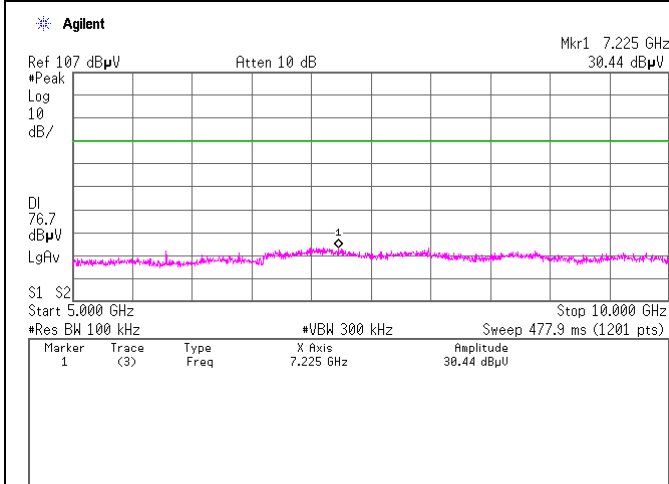
### 30MHz - 1GHz



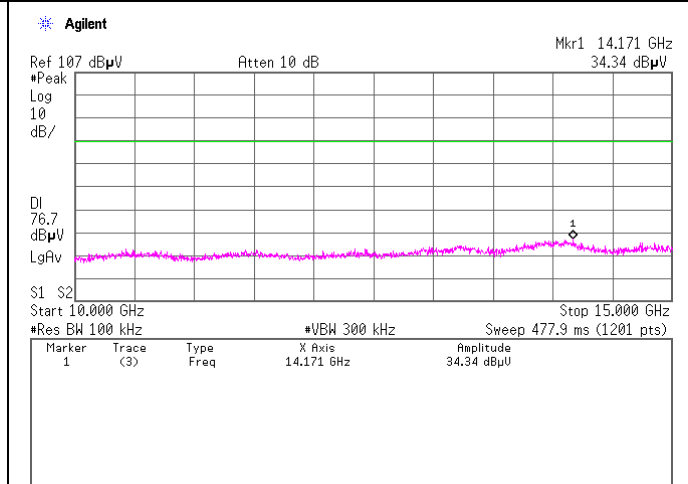
### 1GHz - 5GHz



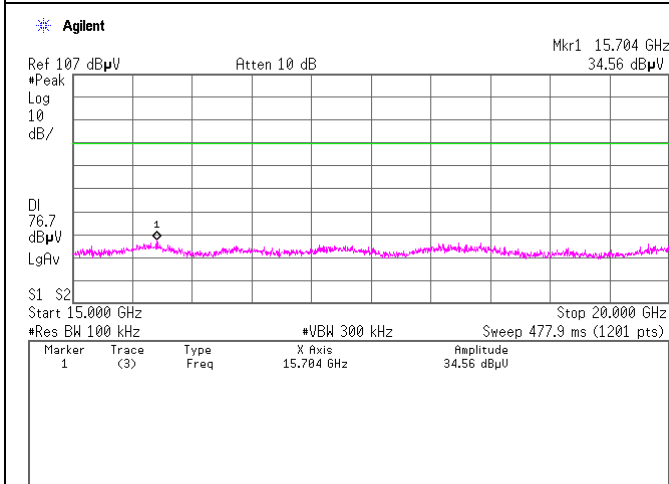
### 5GHz - 10GHz



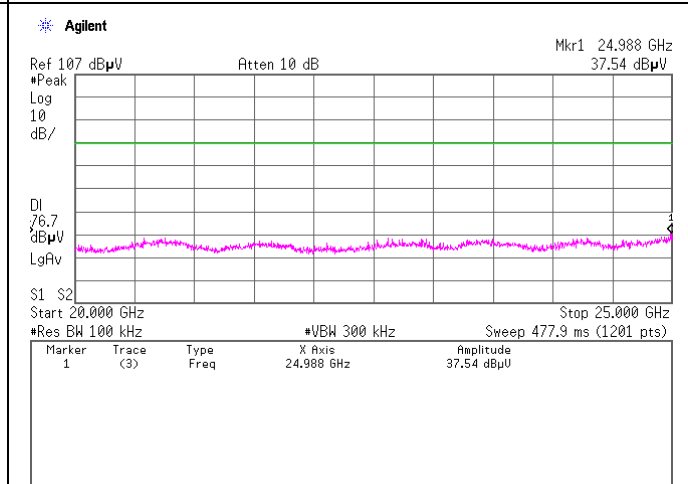
### 10GHz - 15GHz



### 15GHz - 20GHz



### 20GHz - 25GHz



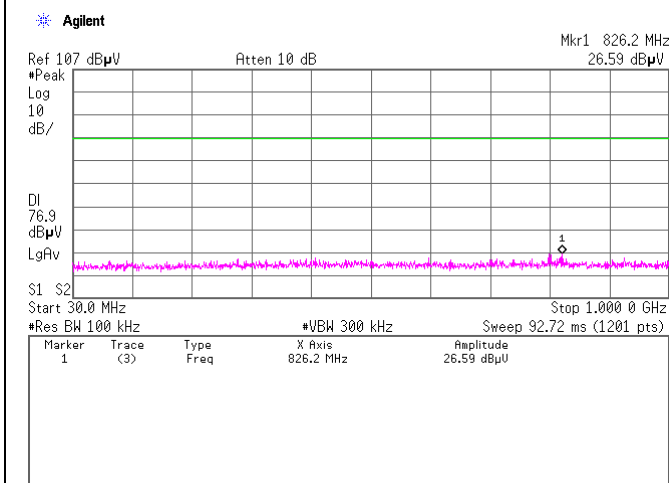
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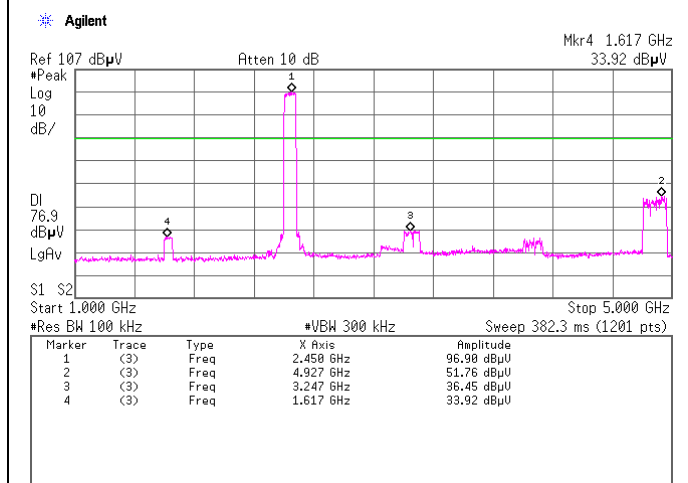
## Spurious emission (Conducted)

DH5,  
Hopping

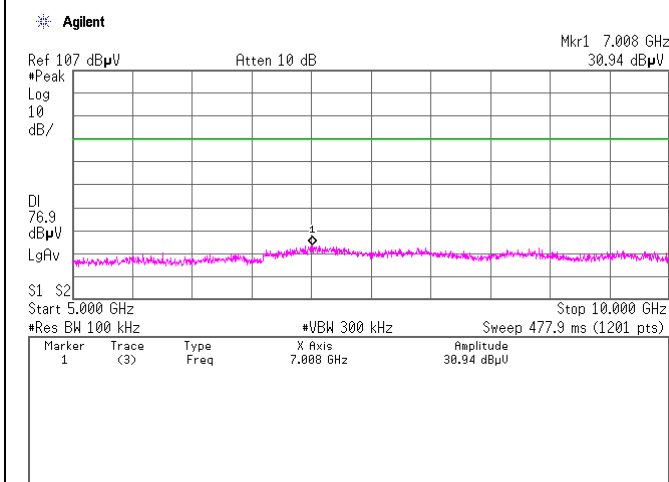
### 30MHz - 1GHz



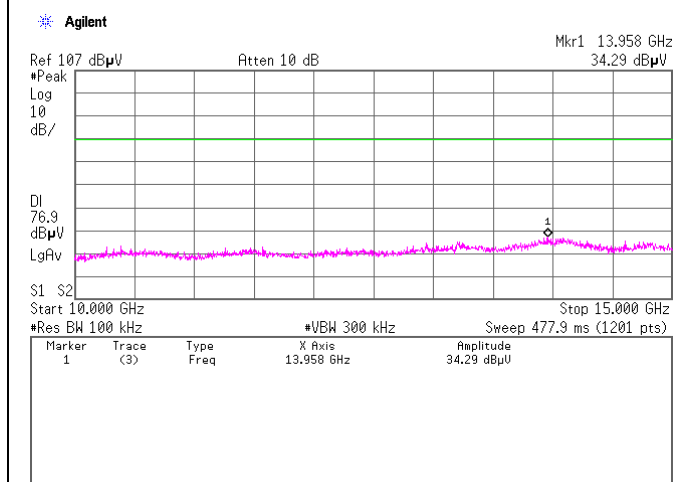
### 1GHz - 5GHz



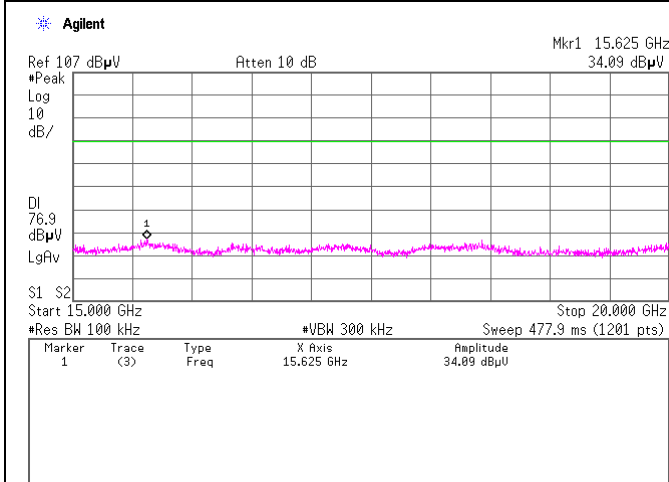
### 5GHz - 10GHz



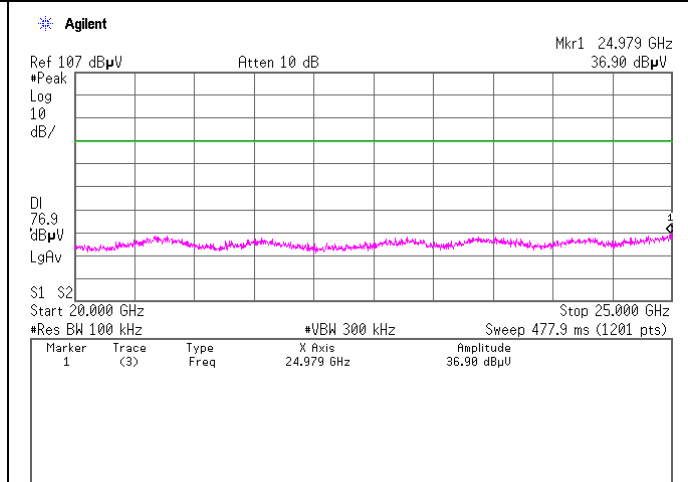
### 10GHz - 15GHz



### 15GHz - 20GHz



### 20GHz - 25GHz



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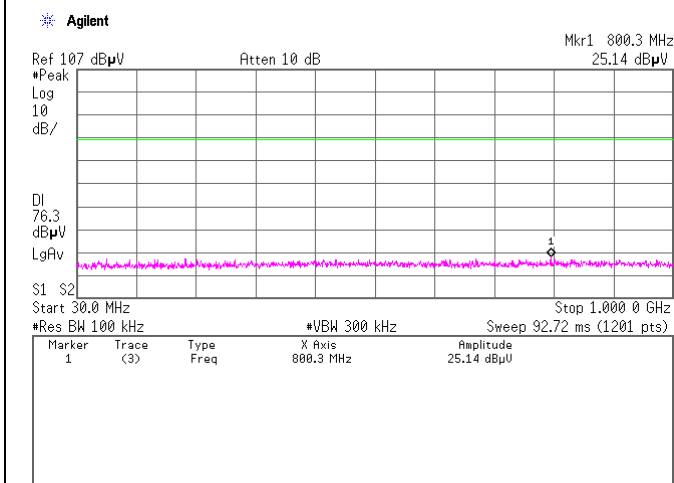


## Spurious emission (Conducted)

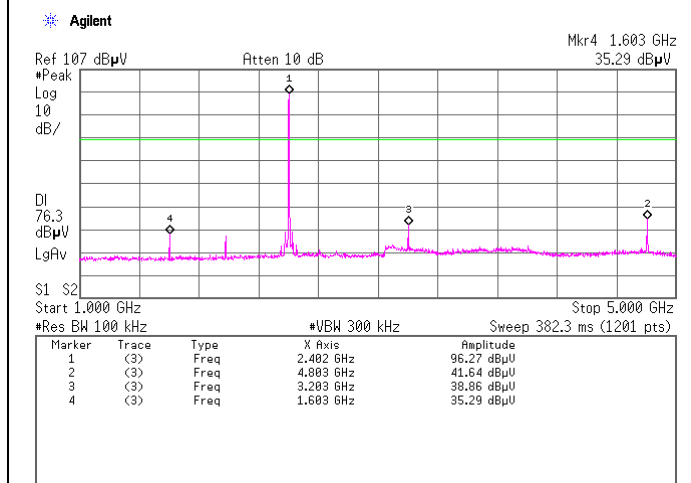
3-DH5,

Tx, 2402MHz

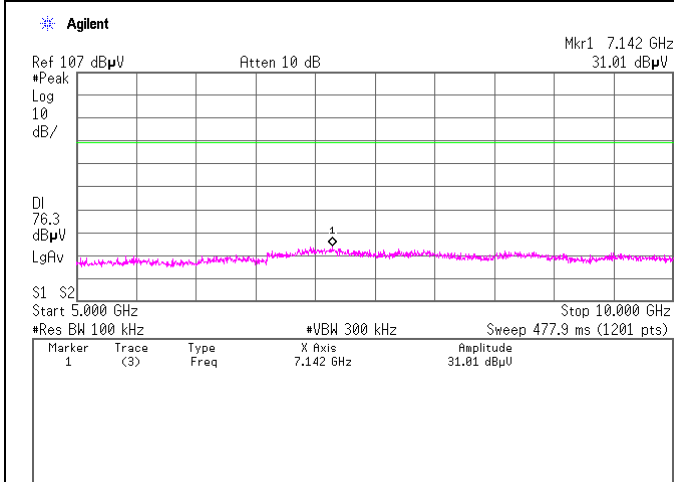
### 30MHz - 1GHz



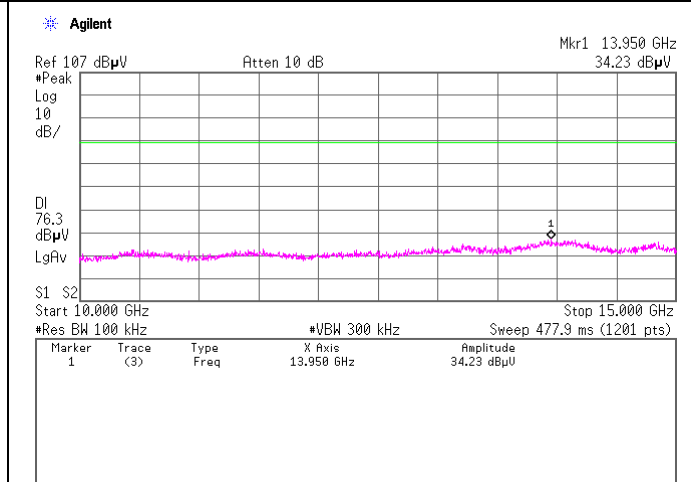
### 1GHz - 5GHz



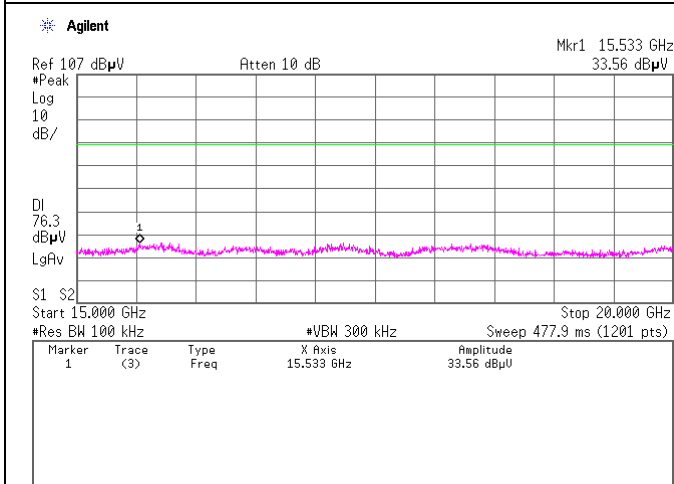
### 5GHz - 10GHz



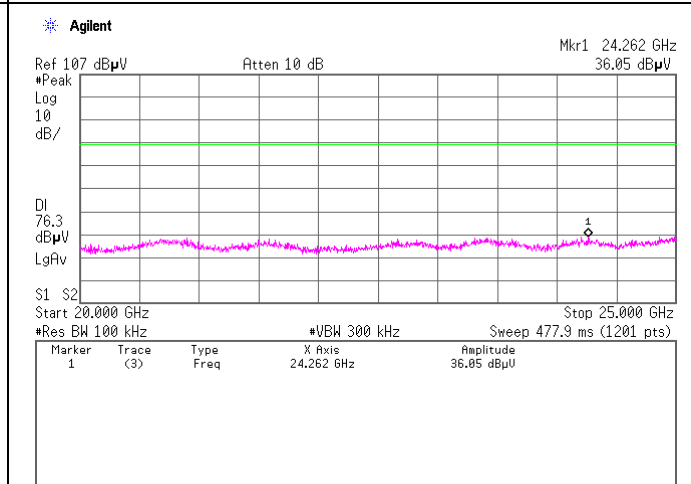
### 10GHz - 15GHz



### 15GHz - 20GHz



### 20GHz - 25GHz



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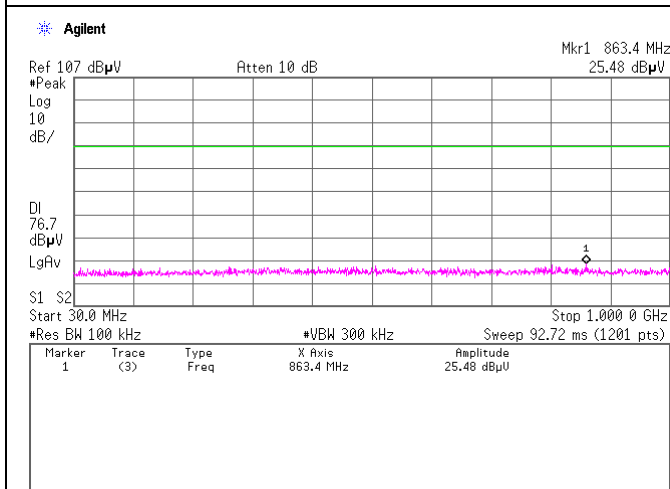
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## Spurious emission (Conducted)

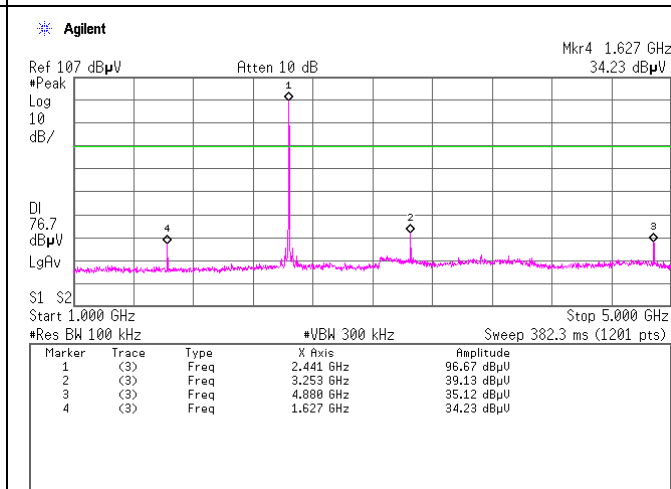
3-DH5,

Tx, 2441MHz

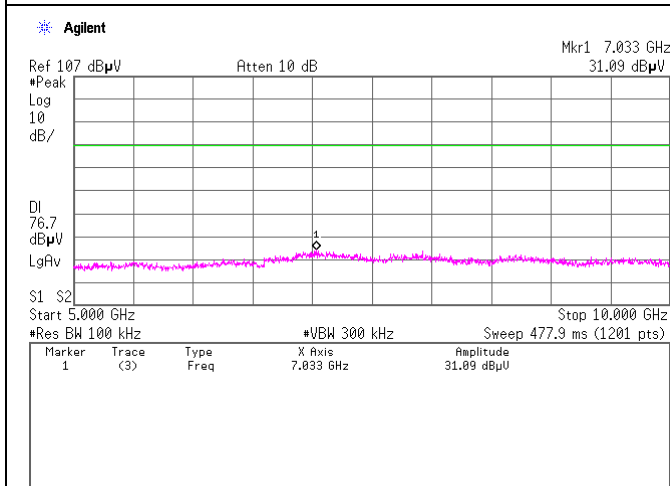
### 30MHz - 1GHz



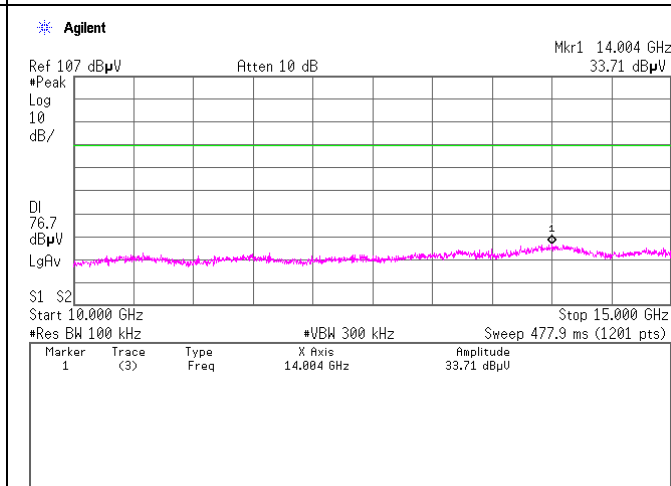
### 1GHz - 5GHz



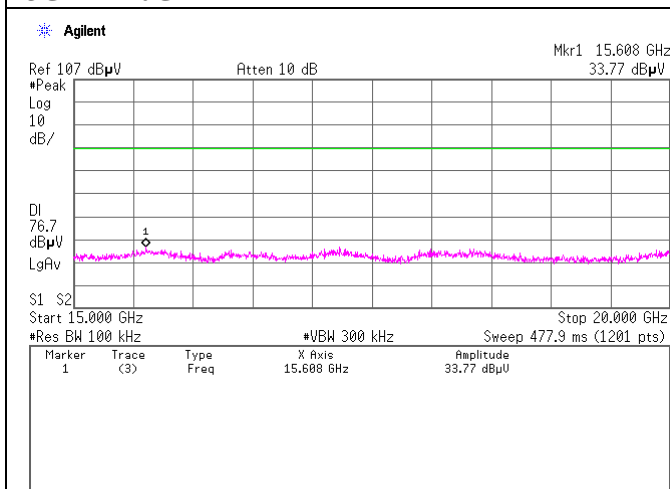
### 5GHz - 10GHz



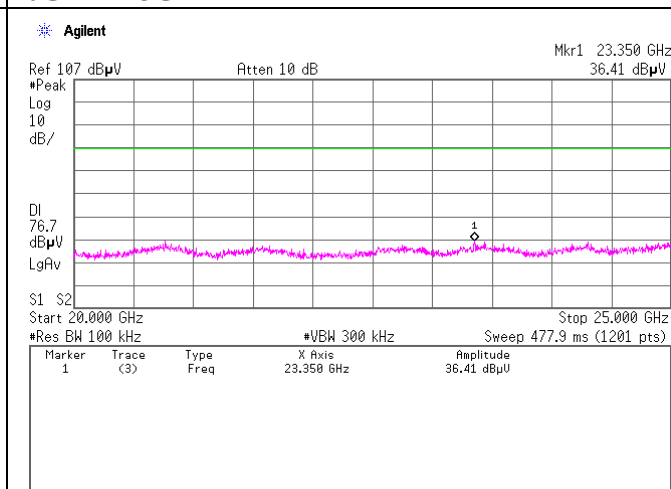
### 10GHz - 15GHz



### 15GHz - 20GHz



### 20GHz - 25GHz



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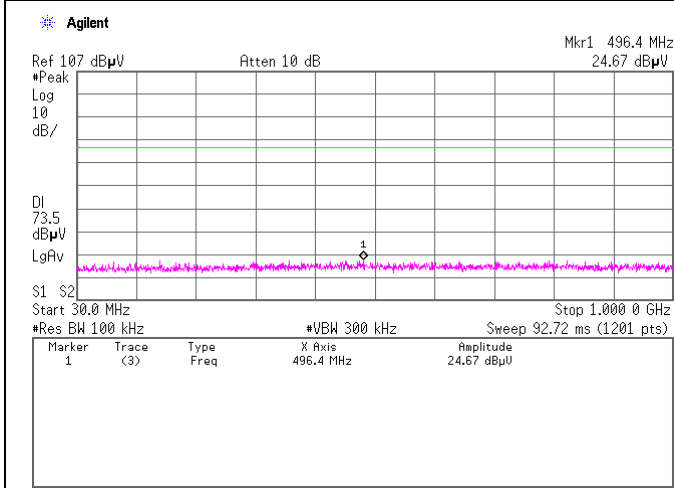
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## Spurious emission (Conducted)

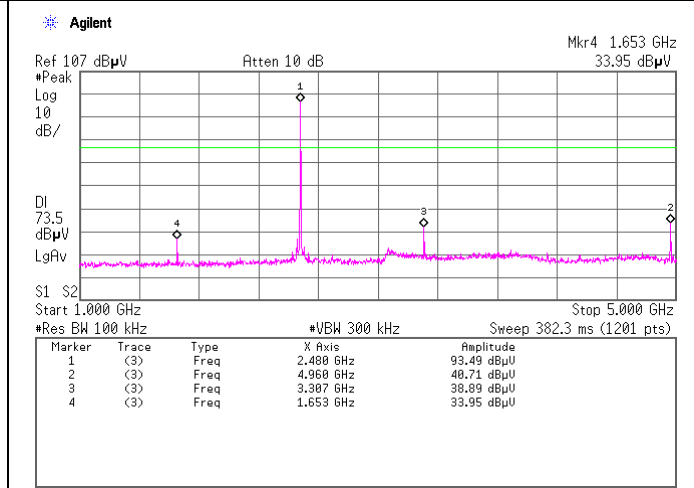
3-DH5,

Tx, 2480MHz

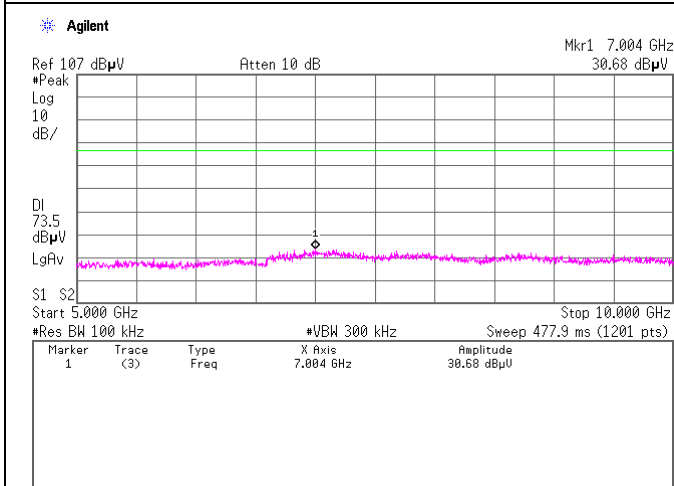
### 30MHz - 1GHz



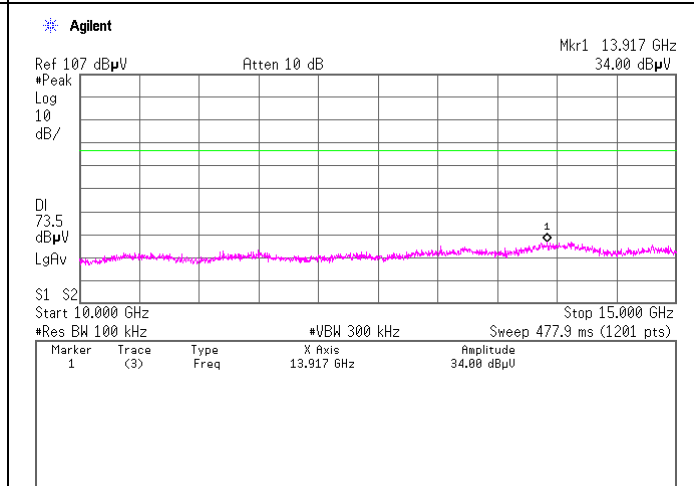
### 1GHz - 5GHz



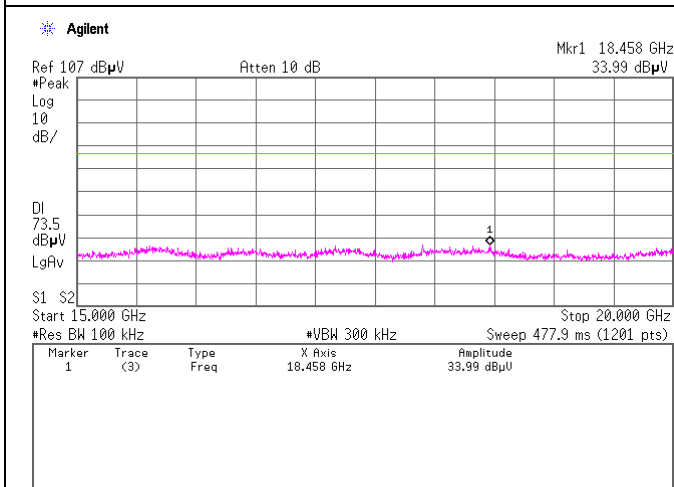
### 5GHz - 10GHz



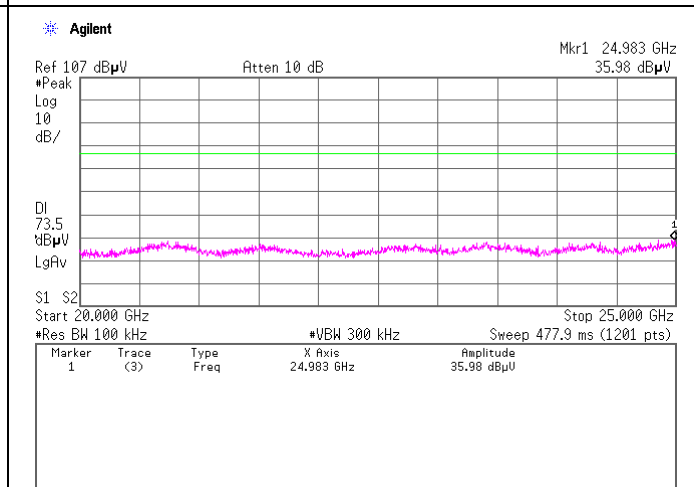
### 10GHz - 15GHz



### 15GHz - 20GHz



### 20GHz - 25GHz

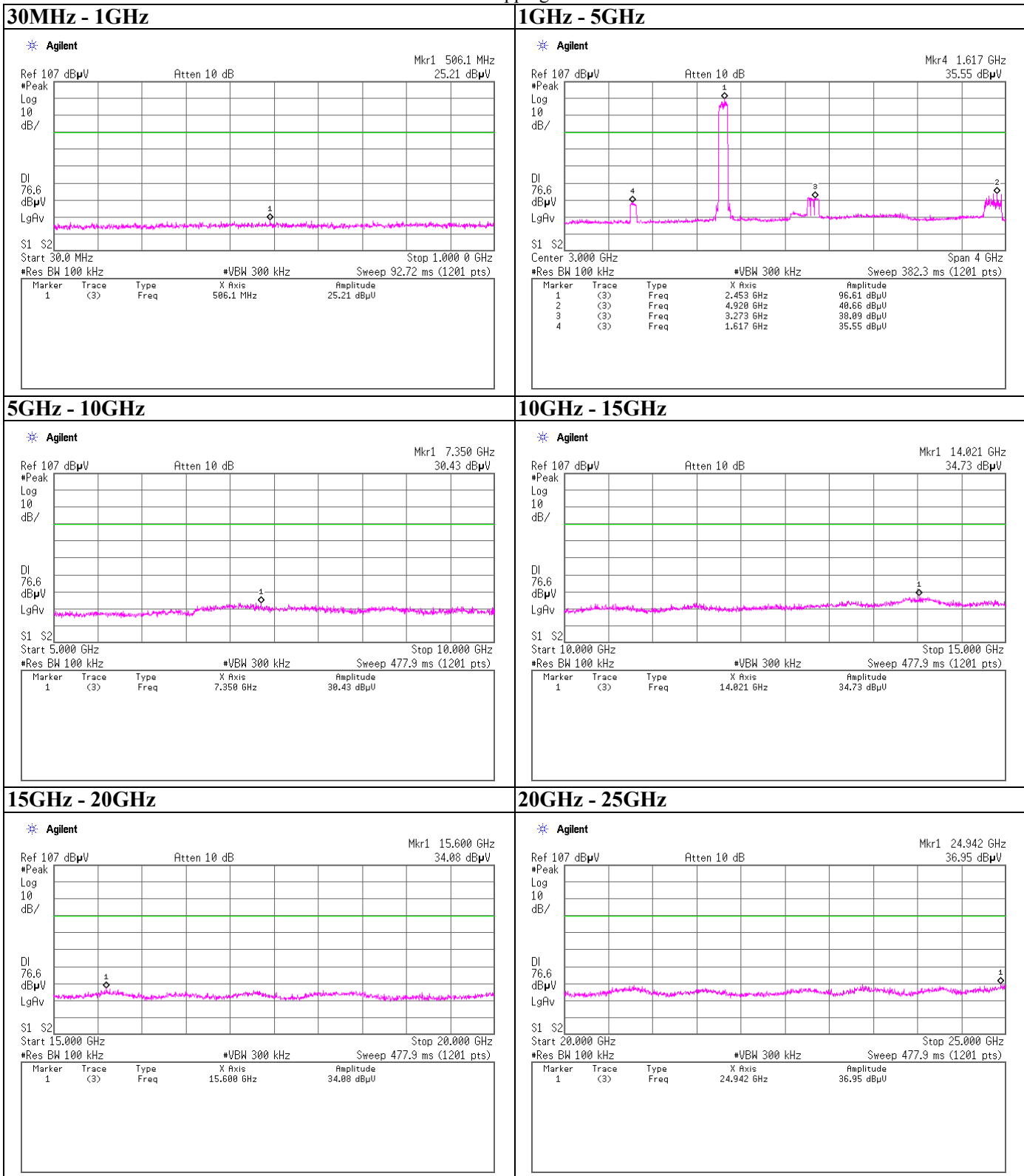


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**Spurious emission (Conducted)**

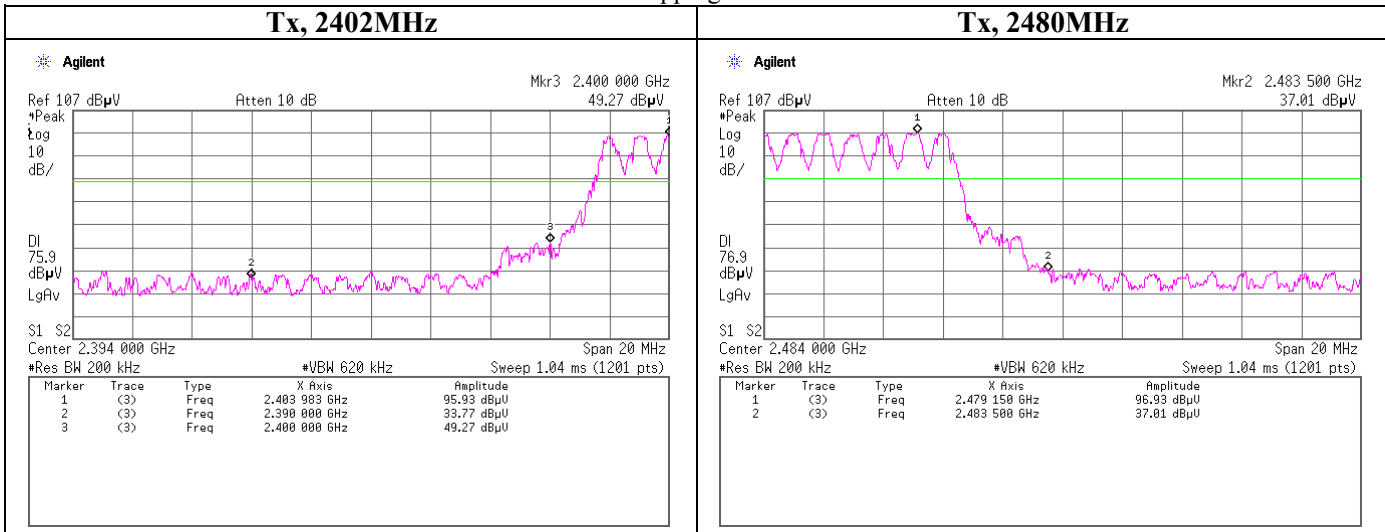
3-DH5,  
Hopping



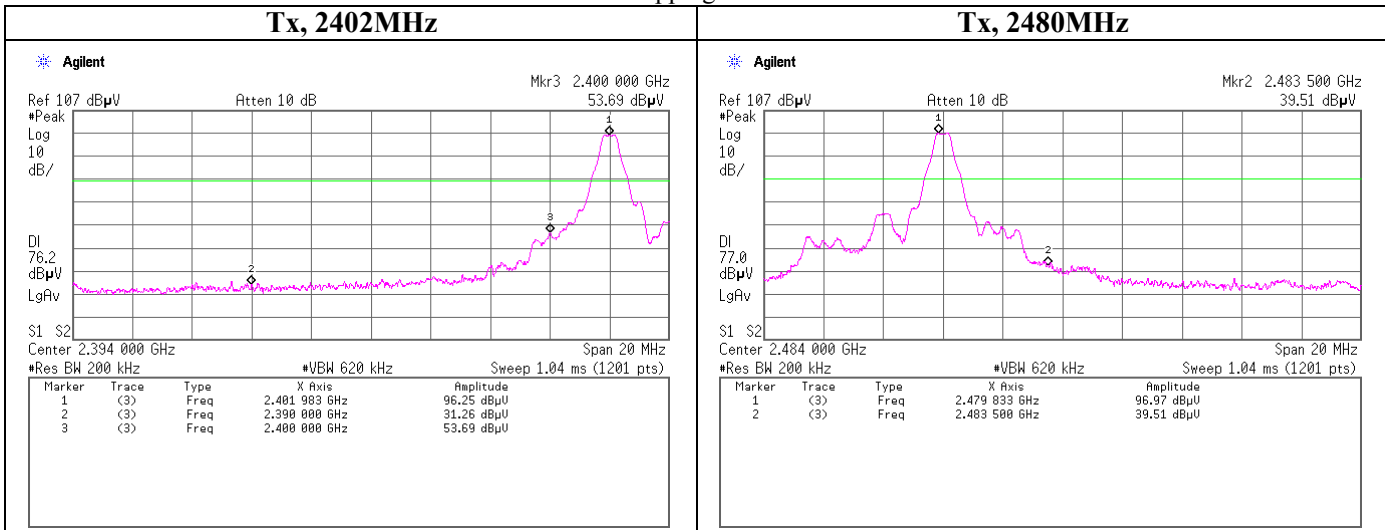
**Spurious emission (Conducted)**

Band Edge compliance  
DH5,

Hopping ON



Hopping OFF



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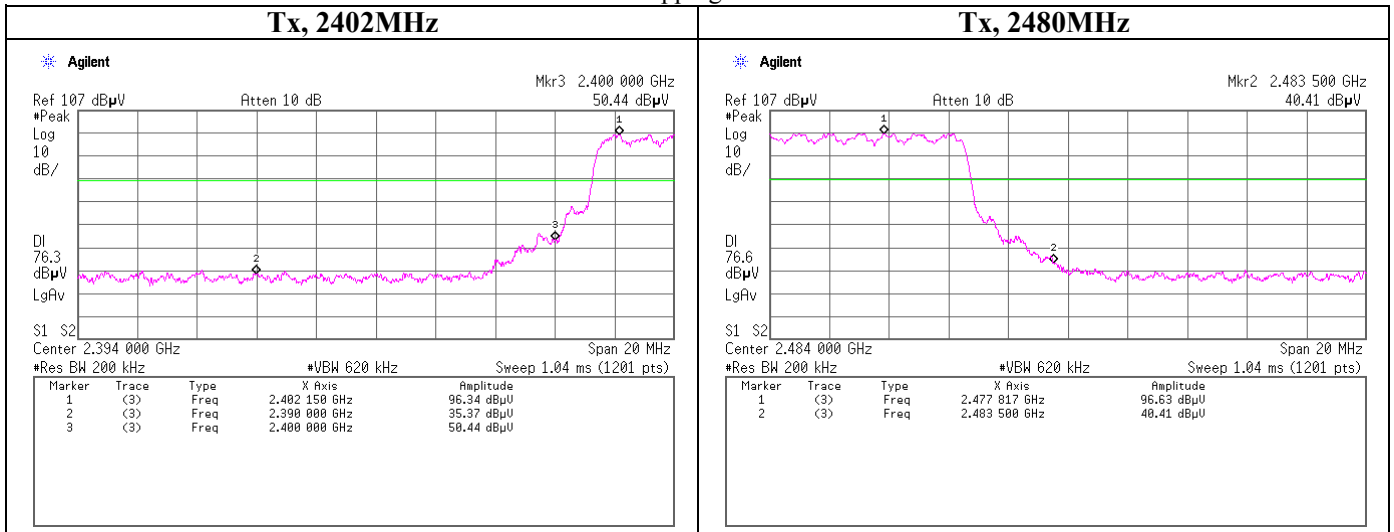
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## Spurious emission (Conducted)

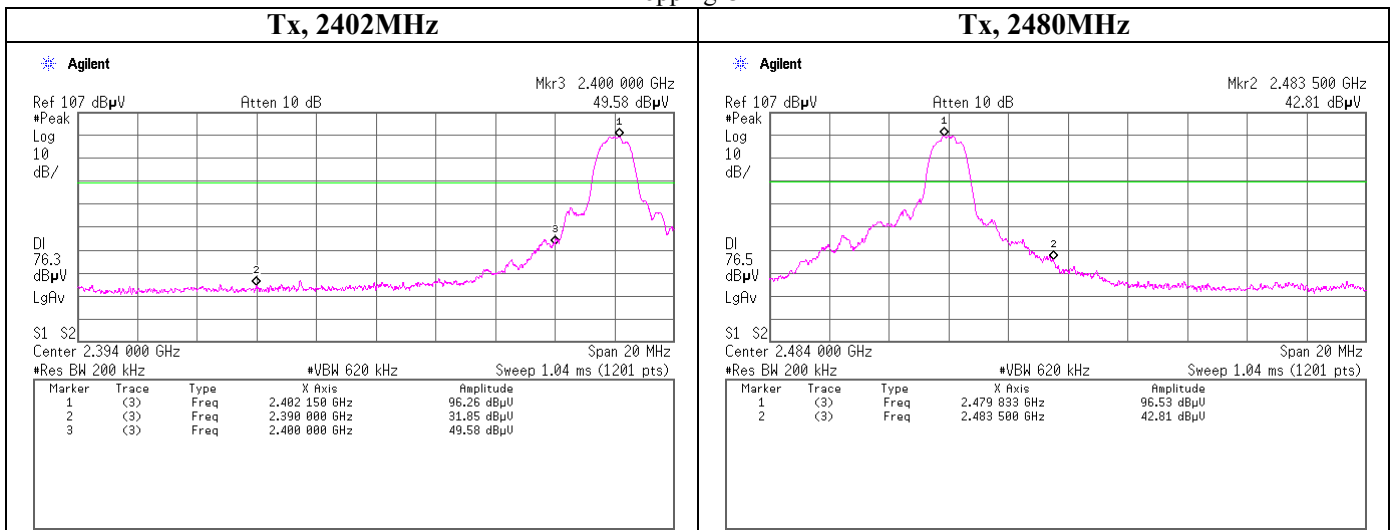
Band Edge compliance

3-DH5,

Hopping ON



Hopping OFF

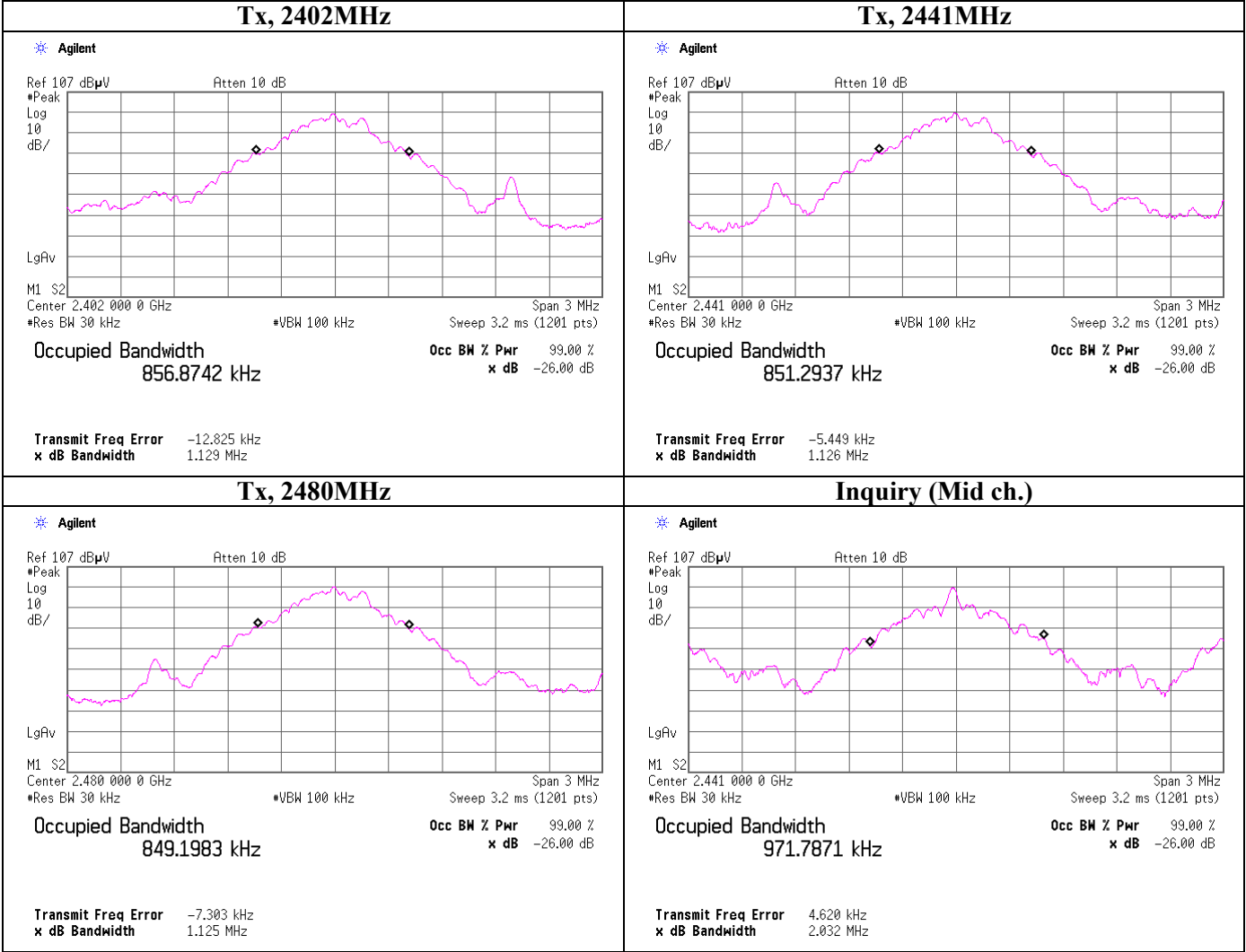


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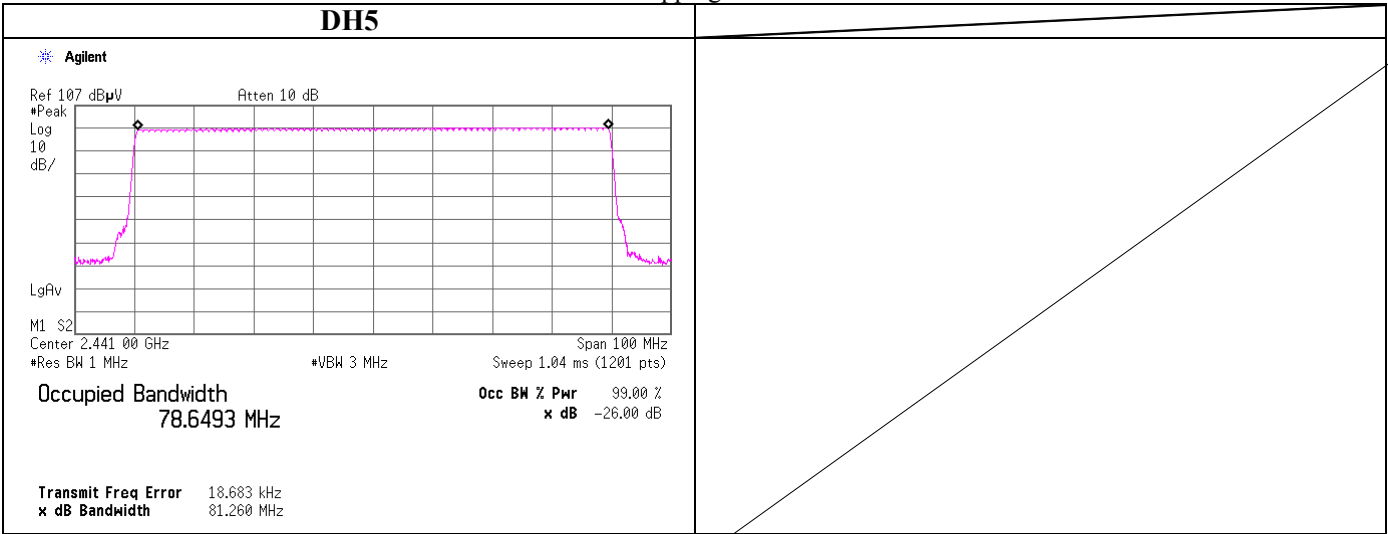
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN  
Telephone : +81 463 50 6400  
Facsimile : +81 463 50 6401

99% Occupied Bandwidth

DH5, Hopping Off



Hopping On

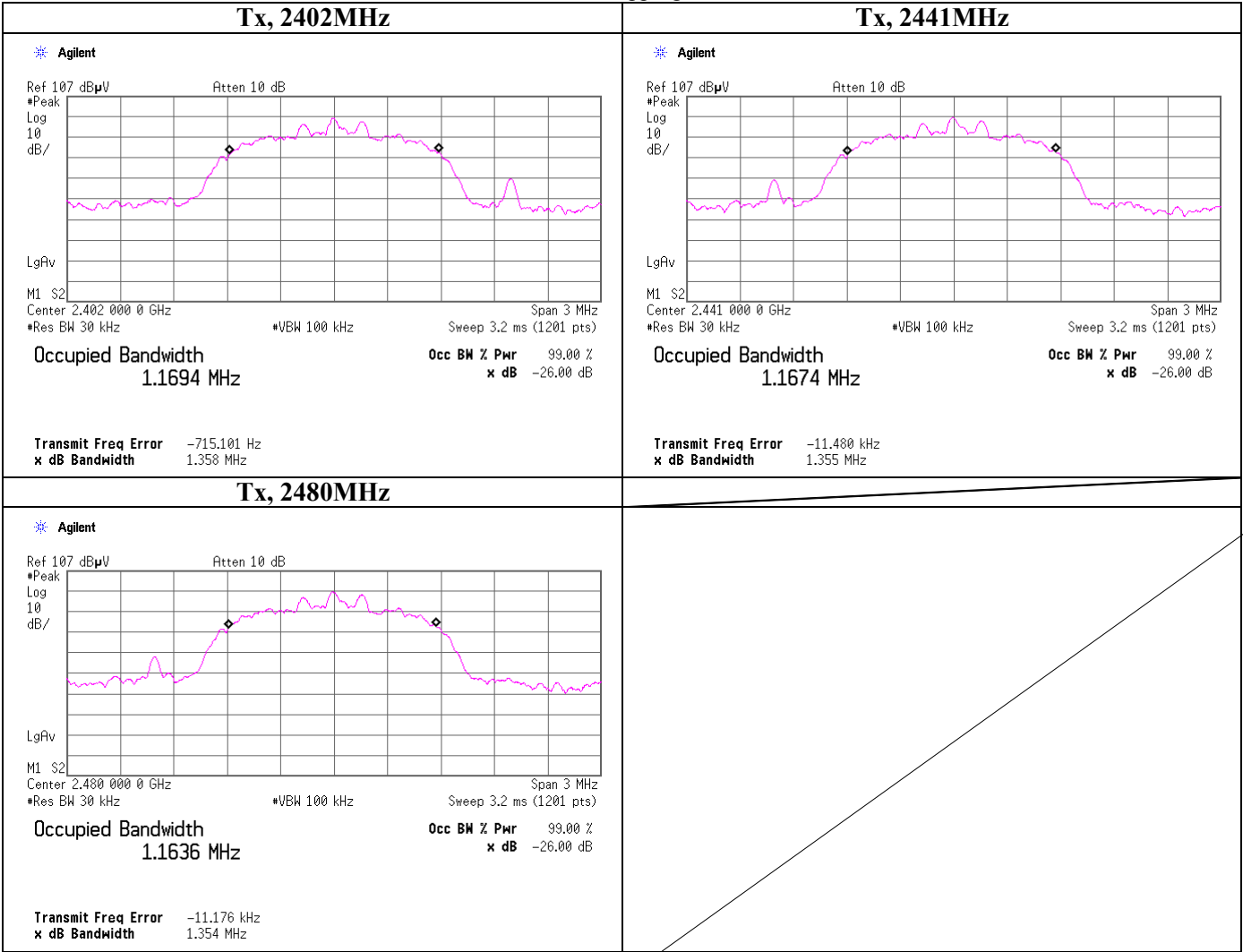


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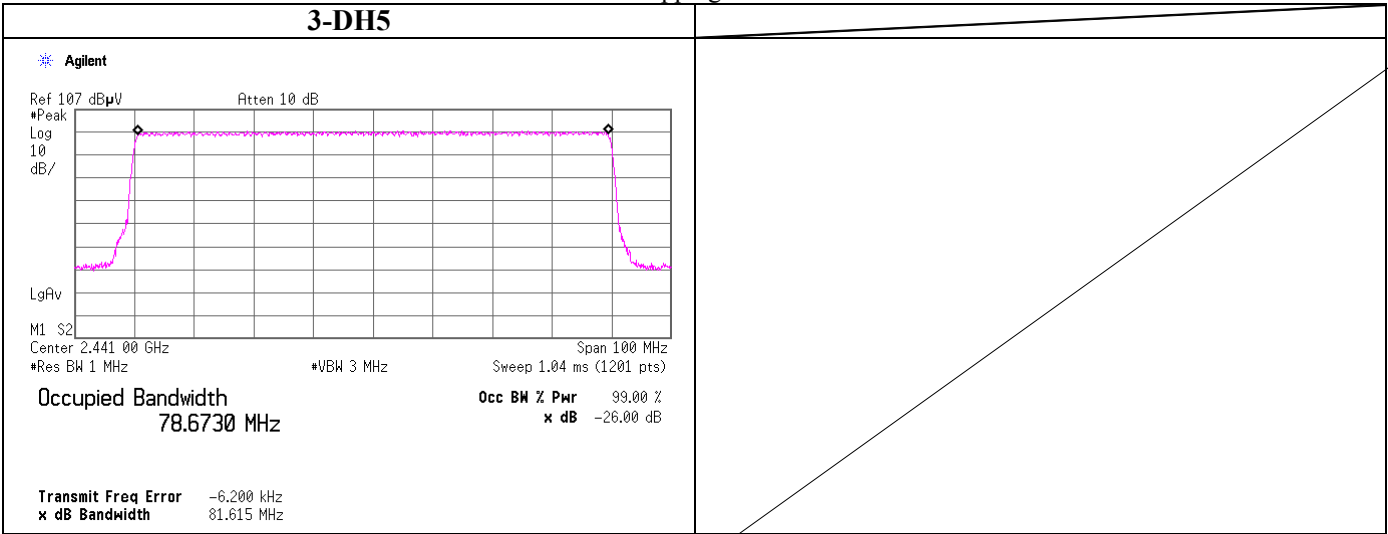
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN  
Telephone : +81 463 50 6400  
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99% Occupied Bandwidth

3-DH5, Hopping Off



Hopping On



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## **APPENDIX 3:Test instruments**

### EMI test equipment

[illegible]

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item:

RE: Spurious Emission (Radiated)  
AT: Antenna terminal conducted test

- 1: Carrier Frequency Separation
- 2: 20dB Bandwidth
- 3: Number of Hopping Frequency
- 4: Dwell time
- 5: Maximum Peak Output Power
- 6: Spurious Emission (Conducted)