# APPENDIX 2: Data of EMI test

## Maximum Peak Output Power

(Reference data)

| | |
|---|---|
| Test place | Head Office EMC Lab. No.4 Measurement Room |
| Report No. | 31DE0057-HO |
| Date | 11/12/2010 |
| Temperature/ Humidity | 25 deg.C./ 32% |
| Engineer | Satofumi Matsuyama |
| Mode | 11b Tx |

Antenna 0

| Freq. | Reading | Cable Loss | Atten. | Result | | Limit | | Margin |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 2412 | 4.28 | 0.50 | 10.00 | 14.78 | 30.06 | 30.00 | 1000 | 15.22 |
| 2437 | 4.25 | 0.50 | 10.00 | 14.75 | 29.85 | 30.00 | 1000 | 15.25 |
| 2462 | 4.12 | 0.50 | 10.00 | 14.62 | 28.97 | 30.00 | 1000 | 15.38 |

Antenna 1

| Freq. | Reading | Cable Loss | Atten. | Result | | Limit | | Margin |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 2412 | 3.61 | 0.50 | 10.00 | 14.11 | 25.76 | 30.00 | 1000 | 15.89 |
| 2437 | 3.80 | 0.50 | 10.00 | 14.30 | 26.92 | 30.00 | 1000 | 15.70 |
| 2462 | 3.71 | 0.50 | 10.00 | 14.21 | 26.36 | 30.00 | 1000 | 15.79 |

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

Antenna 0, 2437MHz

| Rate | Reading | Remark |
|---|---|---|
| [Mbps] | [dBm] | |
| 1 | 4.23 | |
| 2 | 4.25 | * |
| 5.5 | 4.22 | |
| 11 | 4.23 | |

*: Worst Rate
All comparizon were carried out on same frequency and measurement factors.

# Maximum Peak Output Power

(Reference data)

| | |
|---|---|
| Test place | Head Office EMC Lab. No.4 Measurement Room |
| Report No. | 31DE0057-HO |
| Date | 11/12/2010 |
| Temperature/ Humidity | 25 deg.C./ 32% |
| Engineer | Satofumi Matsuyama |
| Mode | 11g Tx |

Antenna 0

| Freq. | Reading | Cable Loss | Atten. | Result | | Limit | | Margin |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 2412 | 13.82 | 0.50 | 10.00 | 24.32 | 270.40 | 30.00 | 1000 | 5.68 |
| 2437 | 14.77 | 0.50 | 10.00 | 25.27 | 336.51 | 30.00 | 1000 | 4.73 |
| 2462 | 13.74 | 0.50 | 10.00 | 24.24 | 265.46 | 30.00 | 1000 | 5.76 |

Antenna 1

| Freq. | Reading | Cable Loss | Atten. | Result | | Limit | | Margin |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 2412 | 14.25 | 0.50 | 10.00 | 24.75 | 298.54 | 30.00 | 1000 | 5.25 |
| 2437 | 14.97 | 0.50 | 10.00 | 25.47 | 352.37 | 30.00 | 1000 | 4.53 |
| 2462 | 13.82 | 0.50 | 10.00 | 24.32 | 270.40 | 30.00 | 1000 | 5.68 |

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

Antenna 0, 2437MHz

| Rate | Reading | Remark |
|---|---|---|
| [Mbps] | [dBm] | |
| 6 | 14.77 | * |
| 9 | 14.52 | |
| 12 | 14.46 | |
| 18 | 14.37 | |
| 24 | 14.42 | |
| 36 | 14.39 | |
| 48 | 14.33 | |
| 54 | 14.40 | |

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

# Maximum Peak Output Power

(Reference data)

| | |
|---|---|
| Test place | Head Office EMC Lab. No.4 Measurement Room |
| Report No. | 31DE0057-HO |
| Date | 11/12/2010 |
| Temperature/ Humidity | 25 deg.C./ 32% |
| Engineer | Satofumi Matsuyama |
| Mode | 11n-20 Tx |

Antenna 0

| Freq. | Reading | Cable Loss | Atten. | Result | | Limit | | Margin |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 2412 | 12.31 | 0.50 | 10.00 | 22.81 | 190.99 | 30.00 | 1000 | 7.19 |
| 2437 | 14.20 | 0.50 | 10.00 | 24.70 | 295.12 | 30.00 | 1000 | 5.30 |
| 2462 | 13.79 | 0.50 | 10.00 | 24.29 | 268.53 | 30.00 | 1000 | 5.71 |

Antenna 1

| Freq. | Reading | Cable Loss | Atten. | Result | | Limit | | Margin |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 2412 | 12.86 | 0.50 | 10.00 | 23.36 | 216.77 | 30.00 | 1000 | 6.64 |
| 2437 | 14.56 | 0.50 | 10.00 | 25.06 | 320.63 | 30.00 | 1000 | 4.94 |
| 2462 | 14.16 | 0.50 | 10.00 | 24.66 | 292.42 | 30.00 | 1000 | 5.34 |

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

Antenna 0, 2437MHz

| MCS | Reading | Remark |
|---|---|---|
| | [dBm] | |
| 0 | 14.20 | * |
| 1 | 14.14 | |
| 2 | 14.12 | |
| 3 | 14.01 | |
| 4 | 14.04 | |
| 5 | 13.82 | |
| 6 | 14.01 | |
| 7 | 14.06 | |

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

# Maximum Peak Output Power

(Reference data)

| | |
|---|---|
| Test place | Head Office EMC Lab. No.4 Measurement Room |
| Report No. | 31DE0057-HO |
| Date | 11/13/2010 |
| Temperature/ Humidity | 23 deg.C./ 34% |
| Engineer | Satofumi Matsuyama |
| Mode | 11n-40 Tx |

Antenna 0

| Freq. | Reading | Cable Loss | Atten. | Result | | Limit | | Margin |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 2422 | 10.96 | 0.50 | 10.00 | 21.46 | 139.96 | 30.00 | 1000 | 8.54 |
| 2437 | 14.26 | 0.50 | 10.00 | 24.76 | 299.23 | 30.00 | 1000 | 5.24 |
| 2452 | 13.17 | 0.50 | 10.00 | 23.67 | 232.81 | 30.00 | 1000 | 6.33 |

Antenna 1

| Freq. | Reading | Cable Loss | Atten. | Result | | Limit | | Margin |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 2422 | 10.77 | 0.50 | 10.00 | 21.27 | 133.97 | 30.00 | 1000 | 8.73 |
| 2437 | 14.28 | 0.50 | 10.00 | 24.78 | 300.61 | 30.00 | 1000 | 5.22 |
| 2452 | 13.46 | 0.50 | 10.00 | 23.96 | 248.89 | 30.00 | 1000 | 6.04 |

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

Antenna 0, 2437MHz, Lower

| MCS | Reading | Remark |
|---|---|---|
| | [dBm] | |
| 0 | 14.26 | * |
| 1 | 14.24 | |
| 2 | 14.17 | |
| 3 | 14.21 | |
| 4 | 14.11 | |
| 5 | 14.20 | |
| 6 | 14.19 | |
| 7 | 14.08 | |

Antenna 0, 2437MHz, Upper

| MCS | Reading | Remark |
|---|---|---|
| | [dBm] | |
| 0 | 14.25 | |
| 1 | 14.24 | |
| 2 | 14.13 | |
| 3 | 14.21 | |
| 4 | 14.19 | |
| 5 | 14.21 | |
| 6 | 14.18 | |
| 7 | 14.15 | |

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

# Maximum Peak Output Power

(Reference data)

| | |
|---|---|
| Test place | Head Office EMC Lab. No.4 Measurement Room |
| Report No. | 31DE0057-HO |
| Date | 11/13/2010 |
| Temperature/ Humidity | 23 deg.C./ 34% |
| Engineer | Satofumi Matsuyama |
| Mode | 11a Tx |

Antenna 0

| Freq. | Reading | Cable Loss | Atten. | Result | | Limit | | Margin |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 5745 | 12.18 | 0.70 | 10.04 | 22.92 | 195.88 | 30.00 | 1000 | 7.08 |
| 5785 | 12.26 | 0.70 | 10.04 | 23.00 | 199.53 | 30.00 | 1000 | 7.00 |
| 5825 | 12.28 | 0.70 | 10.05 | 23.03 | 200.91 | 30.00 | 1000 | 6.97 |

Antenna 1

| Freq. | Reading | Cable Loss | Atten. | Result | | Limit | | Margin |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 5745 | 12.78 | 0.70 | 10.04 | 23.52 | 224.91 | 30.00 | 1000 | 6.48 |
| 5785 | 13.06 | 0.70 | 10.04 | 23.80 | 239.88 | 30.00 | 1000 | 6.20 |
| 5825 | 13.27 | 0.70 | 10.05 | 24.02 | 252.35 | 30.00 | 1000 | 5.98 |

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

Antenna 0, 5785MHz

| Rate | Reading | Remark |
|---|---|---|
| [Mbps] | [dBm] | |
| 6 | 12.26 | * |
| 9 | 12.17 | |
| 12 | 12.10 | |
| 18 | 12.08 | |
| 24 | 12.13 | |
| 36 | 12.11 | |
| 48 | 12.14 | |
| 54 | 12.10 | |

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

# Maximum Peak Output Power

(Reference data)

| | |
|---|---|
| Test place | Head Office EMC Lab. No.4 Measurement Room |
| Report No. | 31DE0057-HO |
| Date | 11/13/2010 |
| Temperature/ Humidity | 23 deg.C./ 34% |
| Engineer | Satofumi Matsuyama |
| Mode | 11n-20 Tx |

Antenna 0

| Freq. | Reading | Cable Loss | Atten. | Result | | Limit | | Margin |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 5745 | 11.37 | 0.70 | 10.04 | 22.11 | 162.55 | 30.00 | 1000 | 7.89 |
| 5785 | 11.83 | 0.70 | 10.04 | 22.57 | 180.72 | 30.00 | 1000 | 7.43 |
| 5825 | 12.03 | 0.70 | 10.05 | 22.78 | 189.67 | 30.00 | 1000 | 7.22 |

Antenna 1

| Freq. | Reading | Cable Loss | Atten. | Result | | Limit | | Margin |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 5745 | 12.14 | 0.70 | 10.04 | 22.88 | 194.09 | 30.00 | 1000 | 7.12 |
| 5785 | 12.79 | 0.70 | 10.04 | 23.53 | 225.42 | 30.00 | 1000 | 6.47 |
| 5825 | 12.98 | 0.70 | 10.05 | 23.73 | 236.05 | 30.00 | 1000 | 6.27 |

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

Antenna 0, 5785MHz

| MCS | Reading | Remark |
|---|---|---|
| | [dBm] | |
| 0 | 11.83 | * |
| 1 | 11.79 | |
| 2 | 11.61 | |
| 3 | 11.68 | |
| 4 | 11.62 | |
| 5 | 11.55 | |
| 6 | 11.19 | |
| 7 | 11.67 | |

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

# Maximum Peak Output Power

(Reference data)

| | |
|---|---|
| Test place | Head Office EMC Lab. No.4 Measurement Room |
| Report No. | 31DE0057-HO |
| Date | 11/13/2010 |
| Temperature/ Humidity | 23 deg.C./ 34% |
| Engineer | Satofumi Matsuyama |
| Mode | 11n-40 Tx |

Antenna 0

| Freq. | Reading | Cable Loss | Atten. | Result | | Limit | | Margin |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 5755 | 11.93 | 0.70 | 10.04 | 22.67 | 184.93 | 30.00 | 1000 | 7.33 |
| 5795 | 11.85 | 0.70 | 10.05 | 22.60 | 181.97 | 30.00 | 1000 | 7.40 |

Antenna 1

| Freq. | Reading | Cable Loss | Atten. | Result | | Limit | | Margin |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 5755 | 12.58 | 0.70 | 10.04 | 23.32 | 214.78 | 30.00 | 1000 | 6.68 |
| 5795 | 12.63 | 0.70 | 10.05 | 23.38 | 217.77 | 30.00 | 1000 | 6.62 |

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

Antenna 0, 5755MHz, Lower

| MCS | Reading | Remark |
|---|---|---|
| | [dBm] | |
| 0 | 11.93 | * |
| 1 | 11.90 | |
| 2 | 11.92 | |
| 3 | 11.90 | |
| 4 | 11.90 | |
| 5 | 11.82 | |
| 6 | 11.78 | |
| 7 | 11.64 | |

Antenna 0, 5755MHz, Upper

| MCS | Reading | Remark |
|---|---|---|
| | [dBm] | |
| 0 | 11.89 | |
| 1 | 11.88 | |
| 2 | 11.86 | |
| 3 | 11.83 | |
| 4 | 11.81 | |
| 5 | 11.77 | |
| 6 | 11.81 | |
| 7 | 11.78 | |

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

# Radiated Spurious Emission

| | |
|---|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber |
| Report No. | 31DE0057-HO-01 |
| Date | 11/18/2010 |
| Temperature/ Humidity | 22 deg.C./ 34% |
| Engineer | Takeshi Choda |
| | (1-10GHz) |
| Mode | 11g Tx 2412MHz & Digital Transmitter Tx 2412MHz |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2390.000 | PK | 71.8 | 27.2 | 2.9 | 32.1 | 69.8 | 73.9 | 4.1 | |
| Hori | 2400.000 | PK | 78.4 | 27.2 | 2.9 | 32.1 | 76.4 | - | - | See 20dBc Data Sheet |
| Hori | 2390.000 | AV | 53.9 | 27.2 | 2.9 | 32.1 | 51.9 | 53.9 | 2.0 | |
| Hori | 2400.000 | AV | 65.1 | 27.2 | 2.9 | 32.1 | 63.1 | - | - | See 20dBc Data Sheet |
| Vert | 2390.000 | PK | 67.6 | 27.2 | 2.9 | 32.1 | 65.6 | 73.9 | 8.3 | |
| Vert | 2400.000 | PK | 83.2 | 27.2 | 2.9 | 32.1 | 81.2 | - | - | See 20dBc Data Sheet |
| Vert | 2390.000 | AV | 50.2 | 27.2 | 2.9 | 32.1 | 48.2 | 53.9 | 5.7 | |
| Vert | 2400.000 | AV | 61.0 | 27.2 | 2.9 | 32.1 | 59.0 | - | - | See 20dBc Data Sheet |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)

**20dBc Data Sheet**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant Factor [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2412.000 | PK | 96.7 | 27.2 | 2.9 | 32.1 | 94.7 | - | - | Carrier |
| Hori | 2400.000 | PK | 68.3 | 27.2 | 2.9 | 32.1 | 66.3 | 74.7 | 8.4 | |
| Vert | 2412.000 | PK | 92.8 | 27.2 | 2.9 | 32.1 | 90.8 | - | - | Carrier |
| Vert | 2400.000 | PK | 61.0 | 27.2 | 2.9 | 32.1 | 59.0 | 70.8 | 11.8 | |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)

# Radiated Spurious Emission

| | | |
|---|---|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber | |
| Report No. | 31DE0057-HO-01 | |
| Date | 11/18/2010 | 11/23/2010 |
| Temperature/ Humidity | 22 deg.C./ 34% | 24 deg.C./ 47% |
| Engineer | Takeshi Choda | Hiroyuki Furutaka |
| | (30MHz-10GHz) | (10-26.5GHz) |
| Mode | 11g Tx 2437MHz & Digital Transmitter Tx 2438MHz | |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 55.294 | QP | 36.9 | 9.7 | 7.4 | 31.9 | 22.1 | 40.0 | 17.9 | |
| Hori | 70.879 | QP | 46.8 | 6.7 | 7.6 | 32.0 | 29.1 | 40.0 | 10.9 | |
| Hori | 269.999 | QP | 36.9 | 18.2 | 9.5 | 31.9 | 32.7 | 46.0 | 13.3 | |
| Hori | 393.209 | QP | 39.2 | 17.4 | 10.3 | 31.9 | 35.0 | 46.0 | 11.0 | |
| Hori | 454.545 | QP | 39.4 | 18.5 | 10.6 | 32.0 | 36.5 | 46.0 | 9.5 | |
| Hori | 909.089 | QP | 30.4 | 24.4 | 12.9 | 31.3 | 36.4 | 46.0 | 9.6 | |
| Hori | 1335.359 | PK | 54.4 | 25.2 | 2.3 | 33.7 | 48.2 | 73.9 | 25.7 | |
| Hori | 1400.078 | PK | 66.4 | 25.5 | 2.3 | 33.6 | 60.6 | 73.9 | 13.3 | |
| Hori | 1999.888 | PK | 61.7 | 27.2 | 2.7 | 32.3 | 59.3 | 73.9 | 14.6 | |
| Hori | 2225.241 | PK | 64.8 | 27.2 | 2.8 | 32.2 | 62.6 | 73.9 | 11.3 | |
| Hori | 2800.037 | PK | 58.6 | 27.7 | 3.1 | 31.9 | 57.5 | 73.9 | 16.4 | |
| Hori | 4874.000 | PK | 48.7 | 31.0 | 5.3 | 31.4 | 53.6 | 73.9 | 20.3 | |
| Hori | 7311.000 | PK | 43.1 | 35.9 | 5.9 | 32.4 | 52.5 | 73.9 | 21.4 | NS |
| Hori | 9748.000 | PK | 42.8 | 38.0 | 7.1 | 33.0 | 54.9 | 73.9 | 19.0 | NS |
| Hori | 24370.000 | PK | 45.5 | 37.9 | -1.2 | 31.6 | 50.6 | 73.9 | 23.3 | NS |
| Hori | 1335.359 | AV | 42.3 | 25.2 | 2.3 | 33.7 | 36.1 | 53.9 | 17.8 | |
| Hori | 1400.078 | AV | 46.0 | 25.5 | 2.3 | 33.6 | 40.2 | 53.9 | 13.7 | |
| Hori | 1999.888 | AV | 48.9 | 27.2 | 2.7 | 32.3 | 46.5 | 53.9 | 7.4 | |
| Hori | 2225.241 | AV | 53.1 | 27.2 | 2.8 | 32.2 | 50.9 | 53.9 | 3.0 | |
| Hori | 2800.037 | AV | 49.0 | 27.7 | 3.1 | 31.9 | 47.9 | 53.9 | 6.0 | |
| Hori | 4874.000 | AV | 36.7 | 31.0 | 5.3 | 31.4 | 41.6 | 53.9 | 12.3 | |
| Hori | 7311.000 | AV | 30.1 | 35.9 | 5.9 | 32.4 | 39.5 | 53.9 | 14.4 | NS |
| Hori | 9748.000 | AV | 30.0 | 38.0 | 7.1 | 33.0 | 42.1 | 53.9 | 11.8 | NS |
| Hori | 24370.000 | AV | 33.8 | 37.9 | -1.2 | 31.6 | 38.9 | 53.9 | 15.0 | NS |
| Vert | 55.294 | QP | 37.2 | 9.7 | 7.4 | 31.9 | 22.4 | 40.0 | 17.6 | |
| Vert | 70.879 | QP | 42.4 | 6.7 | 7.6 | 32.0 | 24.7 | 40.0 | 15.3 | |
| Vert | 269.999 | QP | 35.4 | 18.2 | 9.5 | 31.9 | 31.2 | 46.0 | 14.8 | |
| Vert | 393.209 | QP | 38.1 | 17.4 | 10.3 | 31.9 | 33.9 | 46.0 | 12.1 | |
| Vert | 454.545 | QP | 35.8 | 18.5 | 10.6 | 32.0 | 32.9 | 46.0 | 13.1 | |
| Vert | 909.089 | QP | 34.6 | 24.4 | 12.9 | 31.3 | 40.6 | 46.0 | 5.4 | |
| Vert | 1335.359 | PK | 57.2 | 25.2 | 2.3 | 33.7 | 51.0 | 73.9 | 22.9 | |
| Vert | 1400.078 | PK | 61.7 | 25.5 | 2.3 | 33.6 | 55.9 | 73.9 | 18.0 | |
| Vert | 1999.888 | PK | 58.6 | 27.2 | 2.7 | 32.3 | 56.2 | 73.9 | 17.7 | |
| Vert | 2225.241 | PK | 60.9 | 27.2 | 2.8 | 32.2 | 58.7 | 73.9 | 15.2 | |
| Vert | 2800.037 | PK | 56.9 | 27.7 | 3.1 | 31.9 | 55.8 | 73.9 | 18.1 | |
| Vert | 4874.000 | PK | 50.8 | 31.0 | 5.3 | 31.4 | 55.7 | 73.9 | 18.2 | |
| Vert | 7311.000 | PK | 43.0 | 35.9 | 5.9 | 32.4 | 52.4 | 73.9 | 21.5 | NS |
| Vert | 9748.000 | PK | 43.4 | 38.0 | 7.1 | 33.0 | 55.5 | 73.9 | 18.4 | NS |
| Vert | 24370.000 | PK | 45.7 | 37.9 | -1.2 | 31.6 | 50.8 | 73.9 | 23.1 | NS |
| Vert | 1335.359 | AV | 44.6 | 25.2 | 2.3 | 33.7 | 38.4 | 53.9 | 15.5 | |
| Vert | 1400.078 | AV | 40.9 | 25.5 | 2.3 | 33.6 | 35.1 | 53.9 | 18.8 | |
| Vert | 1999.888 | AV | 48.3 | 27.2 | 2.7 | 32.3 | 45.9 | 53.9 | 8.0 | |
| Vert | 2225.241 | AV | 52.5 | 27.2 | 2.8 | 32.2 | 50.3 | 53.9 | 3.6 | |
| Vert | 2800.037 | AV | 43.7 | 27.7 | 3.1 | 31.9 | 42.6 | 53.9 | 11.3 | |
| Vert | 4874.000 | AV | 37.0 | 31.0 | 5.3 | 31.4 | 41.9 | 53.9 | 12.0 | |
| Vert | 7311.000 | AV | 30.3 | 35.9 | 5.9 | 32.4 | 39.7 | 53.9 | 14.2 | NS |
| Vert | 9748.000 | AV | 30.1 | 38.0 | 7.1 | 33.0 | 42.2 | 53.9 | 11.7 | NS |
| Vert | 24370.000 | AV | 33.9 | 37.9 | -1.2 | 31.6 | 39.0 | 53.9 | 14.9 | NS |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

NS: No Sognal

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# Radiated Spurious Emission

| | |
|---|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber |
| Report No. | 31DE0057-HO-01 |
| Date | 11/18/2010 |
| Temperature/ Humidity | 22 deg.C./ 34% |
| Engineer | Takeshi Choda |
| | (1-10GHz) |
| Mode | 11g Tx 2462MHz & Digital Transmitter Tx 2462MHz |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2483.500 | PK | 68.3 | 27.2 | 2.9 | 32.1 | 66.3 | 73.9 | 7.6 | |
| Hori | 2483.500 | AV | 51.6 | 27.2 | 2.9 | 32.1 | 49.6 | 53.9 | 4.3 | |
| Vert | 2483.500 | PK | 65.9 | 27.2 | 2.9 | 32.1 | 63.9 | 73.9 | 10.0 | |
| Vert | 2483.500 | AV | 46.2 | 27.2 | 2.9 | 32.1 | 44.2 | 53.9 | 9.7 | |

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

# Radiated Spurious Emission

| | |
|---|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber |
| Report No. | 31DE0057-HO-01 |
| Date | 11/23/2010 |
| Temperature/ Humidity | 22 deg.C./ 48% |
| Engineer | Hironobu Ohnishi |
| | (1-10GHz) |
| Mode | 11n-40 Tx 2422MHz & Digital Transmitter Tx 2412MHz |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2390.000 | PK | 72.7 | 27.2 | 2.6 | 32.1 | 70.4 | 73.9 | 3.5 | |
| Hori | 2400.000 | PK | 79.3 | 27.2 | 2.6 | 32.1 | 77.0 | - | - | See 20dBc Data Sheet |
| Hori | 2390.000 | AV | 55.6 | 27.2 | 2.6 | 32.1 | 53.3 | 53.9 | 0.6 | |
| Hori | 2400.000 | AV | 65.9 | 27.2 | 2.6 | 32.1 | 63.6 | - | - | See 20dBc Data Sheet |
| Vert | 2390.000 | PK | 68.9 | 27.2 | 2.6 | 32.1 | 66.6 | 73.9 | 7.3 | |
| Vert | 2400.000 | PK | 75.2 | 27.2 | 2.6 | 32.1 | 72.9 | - | - | See 20dBc Data Sheet |
| Vert | 2390.000 | AV | 50.5 | 27.2 | 2.6 | 32.1 | 48.2 | 53.9 | 5.7 | |
| Vert | 2400.000 | AV | 61.8 | 27.2 | 2.6 | 32.1 | 59.5 | - | - | See 20dBc Data Sheet |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

**20dBc Data Sheet**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant Factor [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2422.000 | PK | 97.7 | 27.2 | 2.6 | 32.1 | 95.4 | - | - | Carrier |
| Hori | 2400.000 | PK | 67.2 | 27.2 | 2.6 | 32.1 | 64.9 | 75.4 | 10.5 | |
| Vert | 2422.000 | PK | 91.5 | 27.2 | 2.6 | 32.1 | 89.2 | - | - | Carrier |
| Vert | 2400.000 | PK | 66.5 | 27.2 | 2.6 | 32.1 | 64.2 | 69.2 | 5.0 | |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)

# Radiated Spurious Emission

| | | |
|---|---|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber | |
| Report No. | 31DE0057-HO-01 | |
| Date | 11/23/2010 | 11/23/2010 |
| Temperature/ Humidity | 22 deg.C./ 48% | 24 deg.C./ 47% |
| Engineer | Hironobu Ohnishi | Hiroyuki Furutaka |
| | (1-10GHz) | (30-1GHz / 10-26.5GHz) |
| Mode | 11n-40 Tx 2437MHz & Digital Transmitter Tx 2438MHz | |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 70.496 | QP | 43.8 | 6.7 | 7.6 | 32.0 | 26.1 | 40.0 | 13.9 | |
| Hori | 78.196 | QP | 48.1 | 6.6 | 7.7 | 32.1 | 30.3 | 40.0 | 9.7 | |
| Hori | 270.002 | QP | 41.9 | 18.2 | 9.5 | 31.9 | 37.7 | 46.0 | 8.3 | |
| Hori | 393.186 | QP | 43.0 | 17.4 | 10.3 | 31.9 | 38.8 | 46.0 | 7.2 | |
| Hori | 729.020 | QP | 31.6 | 22.3 | 12.1 | 32.1 | 33.9 | 46.0 | 12.1 | |
| Hori | 951.660 | QP | 28.0 | 25.5 | 13.1 | 31.2 | 35.4 | 46.0 | 10.6 | |
| Hori | 2225.267 | PK | 63.8 | 27.2 | 2.5 | 32.2 | 61.3 | 73.9 | 12.6 | |
| Hori | 4874.000 | PK | 46.2 | 31.0 | 5.3 | 31.4 | 51.1 | 73.9 | 22.8 | |
| Hori | 7311.000 | PK | 41.5 | 35.9 | 6.3 | 32.4 | 51.3 | 73.9 | 22.6 | NS |
| Hori | 9748.000 | PK | 41.6 | 38.0 | 7.3 | 33.0 | 53.9 | 73.9 | 20.0 | NS |
| Hori | 24370.000 | PK | 45.6 | 37.9 | -1.2 | 31.6 | 50.7 | 73.9 | 23.2 | NS |
| Hori | 2225.267 | AV | 56.3 | 27.2 | 2.5 | 32.2 | 53.8 | 53.9 | 0.1 | |
| Hori | 4874.000 | AV | 35.4 | 31.0 | 5.3 | 31.4 | 40.3 | 53.9 | 13.6 | |
| Hori | 7311.000 | AV | 31.0 | 35.9 | 6.3 | 32.4 | 40.8 | 53.9 | 13.1 | NS |
| Hori | 9748.000 | AV | 30.2 | 38.0 | 7.3 | 33.0 | 42.5 | 53.9 | 11.4 | NS |
| Hori | 24370.000 | AV | 33.7 | 37.9 | -1.2 | 31.6 | 38.8 | 53.9 | 15.1 | NS |
| Vert | 70.892 | QP | 45.9 | 6.7 | 7.6 | 32.0 | 28.2 | 40.0 | 11.8 | |
| Vert | 78.452 | QP | 46.9 | 6.6 | 7.7 | 32.1 | 29.1 | 40.0 | 10.9 | |
| Vert | 270.002 | QP | 36.7 | 18.2 | 9.5 | 31.9 | 32.5 | 46.0 | 13.5 | |
| Vert | 393.217 | QP | 40.5 | 17.4 | 10.3 | 31.9 | 36.3 | 46.0 | 9.7 | |
| Vert | 552.952 | QP | 35.7 | 19.6 | 11.2 | 32.0 | 34.5 | 46.0 | 11.5 | |
| Vert | 668.573 | QP | 34.3 | 21.4 | 11.8 | 32.2 | 35.3 | 46.0 | 10.7 | |
| Vert | 2225.267 | PK | 61.7 | 27.2 | 2.5 | 32.2 | 59.2 | 73.9 | 14.7 | |
| Vert | 4874.000 | PK | 47.7 | 31.0 | 5.3 | 31.4 | 52.6 | 73.9 | 21.3 | |
| Vert | 7311.000 | PK | 46.4 | 35.9 | 6.3 | 32.4 | 56.2 | 73.9 | 17.7 | NS |
| Vert | 9748.000 | PK | 43.5 | 38.0 | 7.3 | 33.0 | 55.8 | 73.9 | 18.1 | NS |
| Vert | 24370.000 | PK | 45.7 | 37.9 | -1.2 | 31.6 | 50.8 | 73.9 | 23.1 | NS |
| Vert | 2225.267 | AV | 53.5 | 27.2 | 2.5 | 32.2 | 51.0 | 53.9 | 2.9 | |
| Vert | 4874.000 | AV | 37.2 | 31.0 | 5.3 | 31.4 | 42.1 | 53.9 | 11.8 | |
| Vert | 7311.000 | AV | 34.4 | 35.9 | 6.3 | 32.4 | 44.2 | 53.9 | 9.7 | NS |
| Vert | 9748.000 | AV | 32.5 | 38.0 | 7.3 | 33.0 | 44.8 | 53.9 | 9.1 | NS |
| Vert | 24370.000 | AV | 33.8 | 37.9 | -1.2 | 31.6 | 38.9 | 53.9 | 15.0 | NS |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

NS: No Signal

# Radiated Spurious Emission

| | |
|---|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber |
| Report No. | 31DE0057-HO-01 |
| Date | 11/23/2010 |
| Temperature/ Humidity | 22 deg.C./ 48% |
| Engineer | Hironobu Ohnishi |
| | (1-10GHz) |
| Mode | 11n-40 Tx 2452MHz & Digital Transmitter Tx 2462MHz |

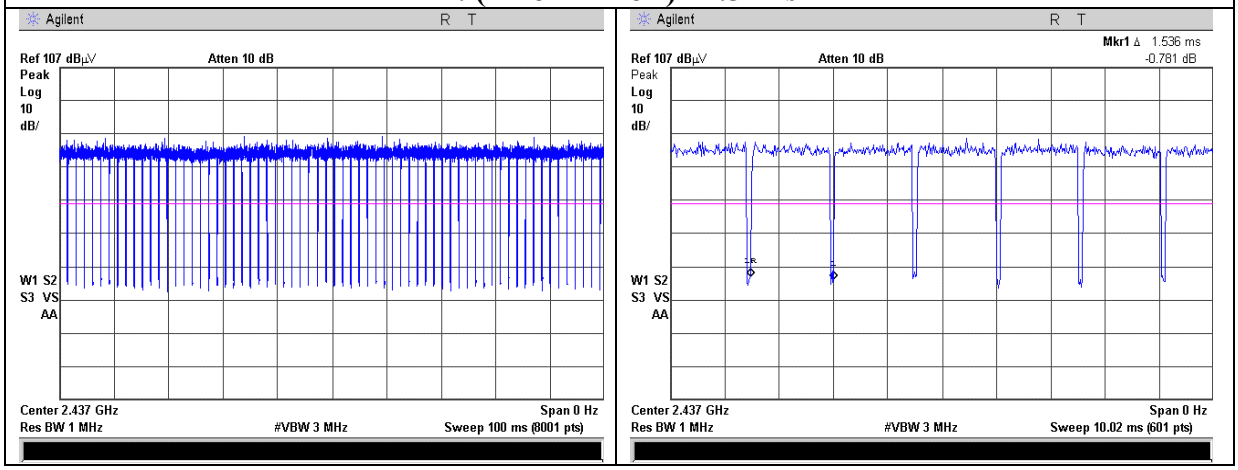
| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 2483.500 | PK | 70.0 | 27.2 | 2.7 | 32.1 | 67.8 | 73.9 | 6.1 | |
| Hori | 2483.500 | AV | 53.9 | 27.2 | 2.7 | 32.1 | 51.7 | 53.9 | 2.2 | |
| Vert | 2483.500 | PK | 64.1 | 27.2 | 2.7 | 32.1 | 61.9 | 73.9 | 12.0 | |
| Vert | 2483.500 | AV | 50.2 | 27.2 | 2.7 | 32.1 | 48.0 | 53.9 | 5.9 | |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

# VBW (AV) Calculation

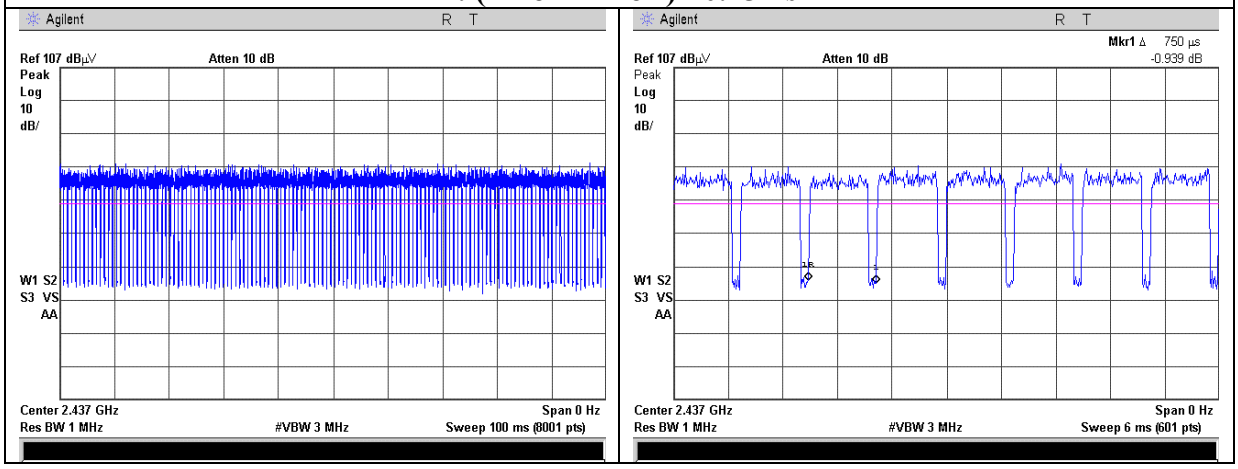
## 11g

**VBW: 10Hz**
**x: (Tx on+Tx off) =1.54ms**




## 11n-40

**VBW: 10Hz**
**x: (Tx on+Tx off) =0.75ms**



# APPENDIX 3: Test instruments

**EMI test equipment**

| Control No. | Instrument | Manufacturer | Model No | Serial No | Test Item | Calibration Date * Interval(month) |
|---|---|---|---|---|---|---|
| MOS-23 | Thermo-Hygrometer | Custom | CTH-201 | 0004 | AT | 2009/12/22 * 12 |
| MPM-12 | Power Meter | Anritsu | ML2495A | 0825002 | AT | 2010/08/20 * 12 |
| MPSE-17 | Power sensor | Anritsu | MA2411B | 0738285 | AT | 2010/08/20 * 12 |
| MAT-22 | Attenuator(10dB) 1-18GHz | Orient Microwave | BX10-0476-00 | - | AT | 2010/03/01 * 12 |
| MAEC-04 | Semi Anechoic Chamber(NSA) | TDK | Semi Anechoic Chamber 3m | DA-10005 | RE | 2010/02/02 * 12 |
| MOS-15 | Thermo-Hygrometer | Custom | CTH-180 | - | RE | 2010/02/09 * 12 |
| MJM-07 | Measure | PROMART | SEN1955 | - | RE | - |
| COTS-MEMI | EMI measurement program | TSJ | TEPTO-DV | - | RE | - |
| MSA-03 | Spectrum Analyzer | Agilent | E4448A | MY44020357 | RE | 2009/11/20 * 12 |
| MHA-21 | Horn Antenna 1-18GHz | Schwarzbeck | BBHA9120D | 9120D-557 | RE | 2010/08/08 * 12 |
| MCC-57 | Microwave Cable | Suhner | SUCOFLEX104 | 246769(1m) / 292411(5m) | RE | 2009/11/17 * 12 |
| MPA-12 | MicroWave System Amplifier | Agilent | 83017A | MY39500780 | RE | 2010/03/16 * 12 |
| MHF-20 | High Pass Filter 3.5-18.0GHz | TOKIMEC | TF323DCC | 607 | RE | 2010/09/21 * 12 |
| MCC-79 | Microwave Cable 1G-26.5GHz | Suhner | SUCOFLEX104 | 278923/4 | RE | 2009/12/19 * 12 |
| MSA-05 | Spectrum Analyzer | Advantest | R3273 | 160400285 | RE | 2010/11/18 * 12 |
| MTR-07 | Test Receiver | Rohde & Schwarz | ESCI | 100635 | RE | 2010/10/27 * 12 |
| MBA-05 | Biconical Antenna | Schwarzbeck | BBA9106 | 1302 | RE | 2010/10/11 * 12 |
| MLA-08 | Logperiodic Antenna | Schwarzbeck | UKLP9140-A | N/A | RE | 2010/10/11 * 12 |
| MCC-50 | Coaxial cable | UL Japan | - | - | RE | 2010/03/18 * 12 |
| MAT-51 | Attenuator(6dB) | Weinschel | 2 | AS3557 | RE | 2010/01/20 * 12 |
| MPA-14 | Pre Amplifier | SONOMA INSTRUMENT | 310 | 260833 | RE | 2010/03/05 * 12 |
| MSA-10 | Spectrum Analyzer | Agilent | E4448A | MY46180655 | RE | 2010/02/03 * 12 |
| MCC-56 | Microwave Cable | Suhner | SUCOFLEX104 | 174410(1m) / 284655(5m) | RE | 2010/01/25 * 12 |
| MHA-17 | Horn Antenna 15-40GHz | Schwarzbeck | BBHA9170 | BBHA9170307 | RE | 2010/06/29 * 12 |
| MSA-06 | Spectrum Analyzer | Agilent | E4407B | MY45107638 | RE | 2010/04/07 * 12 |

**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: Radiated Emission**
**AT: Antenna Terminal Conducted test**