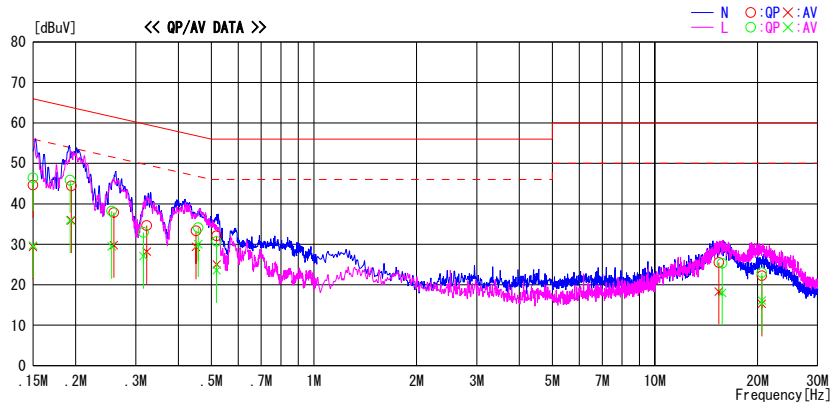
# APPENDIX 2: Data of EMI test

## Conducted Emission

| | |
|---|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber |
| Report No. | 29IE0011-HO-01 |
| Date | 05/02/2009 |
| Temperature/ Humidity | 21 deg.C./ 40% |
| Engineer | Hironobu Ohnishi |
| Mode | Tx 2402MHz, DH5 |




| Frequency | Reading Level | | Corr. | Results | | Limit | | Margin | | Phase |
|---|---|---|---|---|---|---|---|---|---|---|
| | QP | AV | Factor | QP | AV | QP | AV | QP | AV | |
| [MHz] | [dBuV] | [dBuV] | [dB] | [dBuV] | [dBuV] | [dBuV] | [dBuV] | [dB] | [dB] | |
| 0.15000 | 44.4 | 29.2 | 0.2 | 44.6 | 29.4 | 66.0 | 56.0 | 21.4 | 26.6 | N |
| 0.19430 | 44.1 | 35.6 | 0.3 | 44.4 | 35.9 | 63.9 | 53.9 | 19.5 | 18.0 | N |
| 0.25865 | 37.5 | 29.5 | 0.3 | 37.8 | 29.8 | 61.5 | 51.5 | 23.7 | 21.7 | N |
| 0.32323 | 34.3 | 27.9 | 0.3 | 34.6 | 28.2 | 59.6 | 49.6 | 25.0 | 21.4 | N |
| 0.45071 | 33.0 | 29.1 | 0.3 | 33.3 | 29.4 | 56.9 | 46.9 | 23.6 | 17.5 | N |
| 0.51826 | 31.8 | 24.7 | 0.3 | 32.1 | 25.0 | 56.0 | 46.0 | 23.9 | 21.0 | N |
| 15.39348 | 24.1 | 16.9 | 1.4 | 25.5 | 18.3 | 60.0 | 50.0 | 34.5 | 31.7 | N |
| 20.57264 | 20.5 | 13.6 | 1.7 | 22.2 | 15.3 | 60.0 | 50.0 | 37.8 | 34.7 | N |
| 0.15000 | 46.2 | 29.5 | 0.2 | 46.4 | 29.7 | 66.0 | 56.0 | 19.6 | 26.3 | L |
| 0.19280 | 45.5 | 35.6 | 0.3 | 45.8 | 35.9 | 63.9 | 53.9 | 18.1 | 18.0 | L |
| 0.25506 | 37.9 | 29.2 | 0.3 | 38.2 | 29.5 | 61.6 | 51.6 | 23.4 | 22.1 | L |
| 0.31648 | 32.6 | 26.8 | 0.3 | 32.9 | 27.1 | 59.8 | 49.8 | 26.9 | 22.7 | L |
| 0.45763 | 33.8 | 29.7 | 0.3 | 34.1 | 30.0 | 56.7 | 46.7 | 22.6 | 16.7 | L |
| 0.51818 | 30.4 | 23.3 | 0.3 | 30.7 | 23.6 | 56.0 | 46.0 | 25.3 | 22.4 | L |
| 15.73289 | 23.9 | 16.6 | 1.4 | 25.3 | 18.0 | 60.0 | 50.0 | 34.7 | 32.0 | L |
| 20.58083 | 21.3 | 14.4 | 1.7 | 23.0 | 16.1 | 60.0 | 50.0 | 37.0 | 33.9 | L |

CHART:WITH FACTOR,Peak hold data. CALCURATION:RESULT[dBuV]=READING[dBuV]+C.F[dB](LISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

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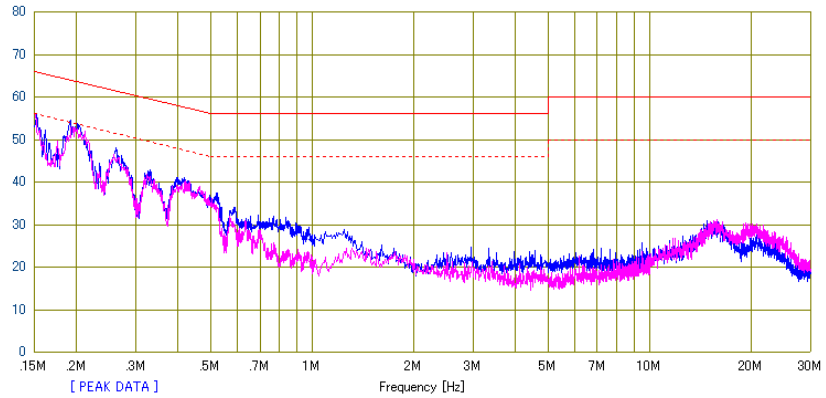
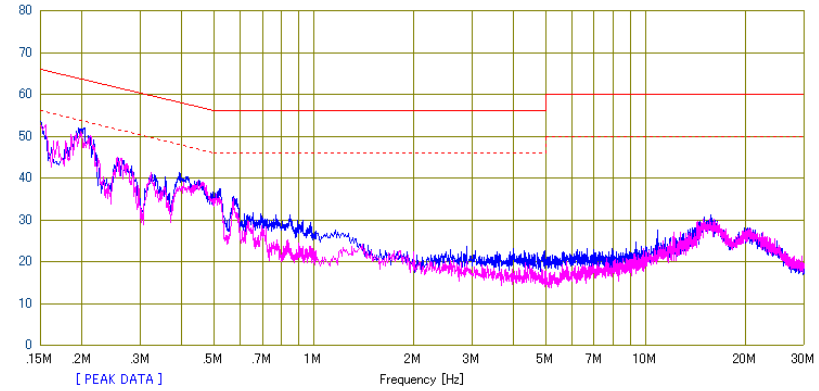
# Conducted Emission

| | |
|---|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber |
| Report No. | 29IE0011-HO-01 |
| Date | 05/02/2009 |
| Temperature/ Humidity | 21 deg.C./ 40% |
| Engineer | Hironobu Ohnishi |
| Mode | Tx DH5 |

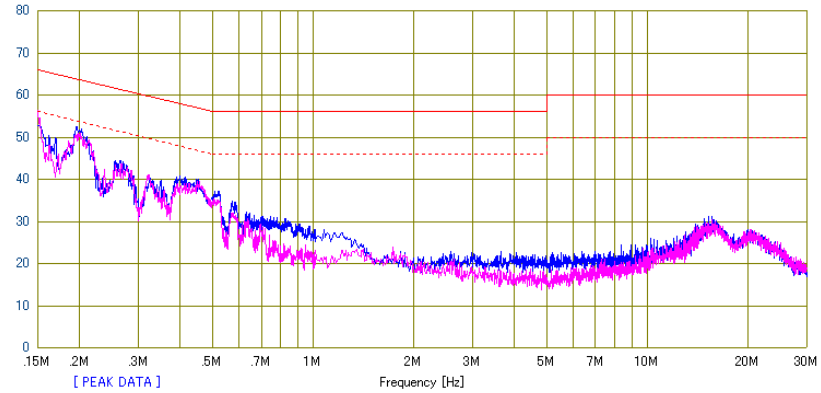
**2402MHz**




**2441MHz**




**2480MHz**




Y scale [dBuV] Chart — N — L

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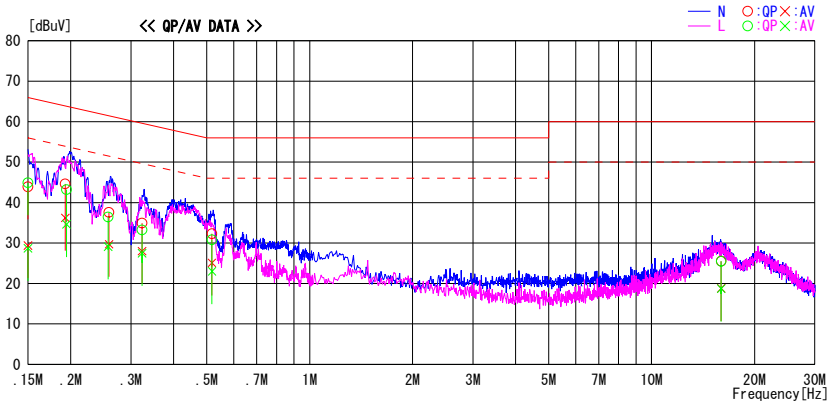
# Conducted Emission

| | |
|---|---|
| Test place | Head Office EMC Lab. No.4 Semi Anechoic Chamber |
| Report No. | 29IE0011-HO-01 |
| Date | 05/02/2009 |
| Temperature/ Humidity | 21 deg.C./ 40% |
| Engineer | Hironobu Ohnishi |
| Mode | Rx 2441MHz |




| Frequency | Reading Level | | Corr. | Results | | Limit | | Margin | | Phase |
|---|---|---|---|---|---|---|---|---|---|---|
| | QP | AV | Factor | QP | AV | QP | AV | QP | AV | |
| [MHz] | [dBuV] | [dBuV] | [dB] | [dBuV] | [dBuV] | [dBuV] | [dBuV] | [dB] | [dB] | |
| 0.15000 | 43.7 | 29.2 | 0.2 | 43.9 | 29.4 | 66.0 | 56.0 | 22.1 | 26.6 | N |
| 0.19290 | 44.3 | 35.9 | 0.3 | 44.6 | 36.2 | 63.9 | 53.9 | 19.3 | 17.7 | N |
| 0.25902 | 37.3 | 29.4 | 0.3 | 37.6 | 29.7 | 61.5 | 51.5 | 23.9 | 21.8 | N |
| 0.32347 | 34.6 | 27.7 | 0.3 | 34.9 | 28.0 | 59.6 | 49.6 | 24.7 | 21.6 | N |
| 0.51764 | 32.0 | 24.8 | 0.3 | 32.3 | 25.1 | 56.0 | 46.0 | 23.7 | 20.9 | N |
| 15.97115 | 24.0 | 17.3 | 1.5 | 25.5 | 18.8 | 60.0 | 50.0 | 34.5 | 31.2 | N |
| 0.15000 | 44.7 | 28.5 | 0.2 | 44.9 | 28.7 | 66.0 | 56.0 | 21.1 | 27.3 | L |
| 0.19466 | 42.9 | 34.3 | 0.3 | 43.2 | 34.6 | 63.8 | 53.8 | 20.6 | 19.2 | L |
| 0.25736 | 36.1 | 28.8 | 0.3 | 36.4 | 29.1 | 61.5 | 51.5 | 25.1 | 22.4 | L |
| 0.32343 | 32.9 | 27.2 | 0.3 | 33.2 | 27.5 | 59.6 | 49.6 | 26.4 | 22.1 | L |
| 0.51826 | 30.5 | 22.7 | 0.3 | 30.8 | 23.0 | 56.0 | 46.0 | 25.2 | 23.0 | L |
| 15.97283 | 24.0 | 17.2 | 1.5 | 25.5 | 18.7 | 60.0 | 50.0 | 34.5 | 31.3 | L |

CHART:WITH FACTOR,Peak hold data. CALCURATION:RESULT[dBuV]=READING[dBuV]+C.F[dB](LISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

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# 20dB Bandwidth and Carrier Frequency Separation

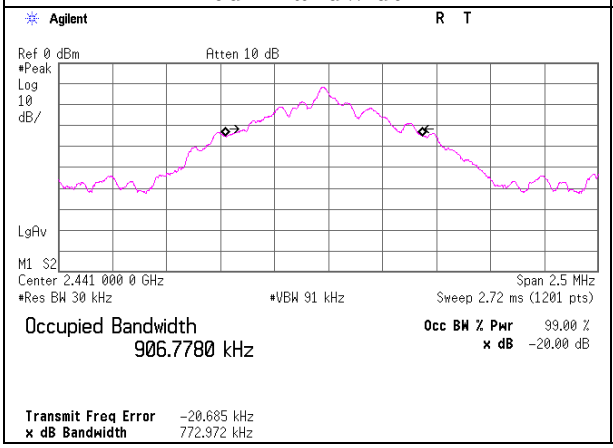
| | | |
|---|---|---|
| Test place | Head Office EMC Lab. No.6 Shielded Room | |
| Report No. | 29IE0011-HO-01 | |
| Date | 05/11/2009 | 06/02/2009 |
| Temperature/ Humidity | 25 deg.C./ 43% | 23 deg.C./ 61% |
| Engineer | Takeshi Choda | Hironobu Ohnishi |
| Mode | Tx (Hopping on) DH5/Inquiry | |
| | Tx (Hopping off) DH5 | |

| Mode | Freq. [MHz] | 20dB Bandwidth [MHz] | Carrier Frequency Separation [MHz] | Limit for Carrier Frequency separation [MHz] |
|---|---|---|---|---|
| DH5 | 2402.0 | 0.971 | 1.000 | >= 0.971 |
| DH5 | 2441.0 | 0.975 | 1.000 | >= 0.975 |
| DH5 | 2480.0 | 0.978 | 1.013 | >= 0.978 |
| Inquiry | 2441.0 | 0.773 | 2.004 | >= 0.773 |

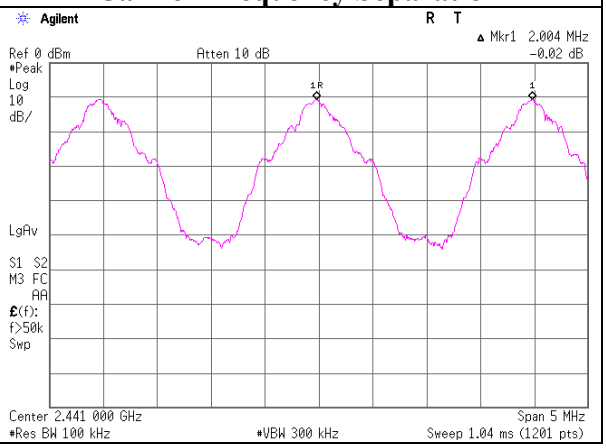
Limit: 20dB Bandwidth or 25kHz (whichever is greater).
No limit applies to 20dB Bandwidth.

## Inquiry

### 20dB Bandwidth




### Carrier Frequency Separation

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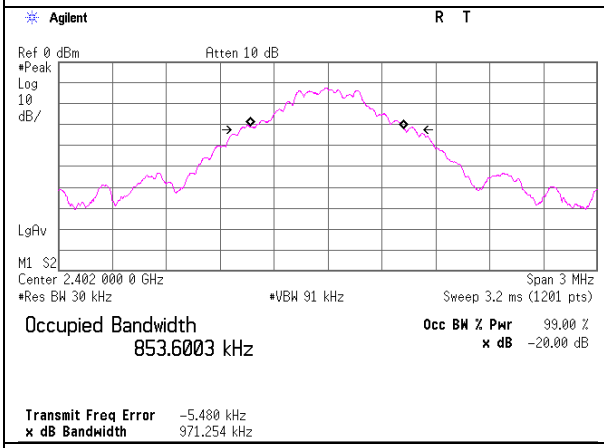
# 20dB Bandwidth and Carrier Frequency Separation

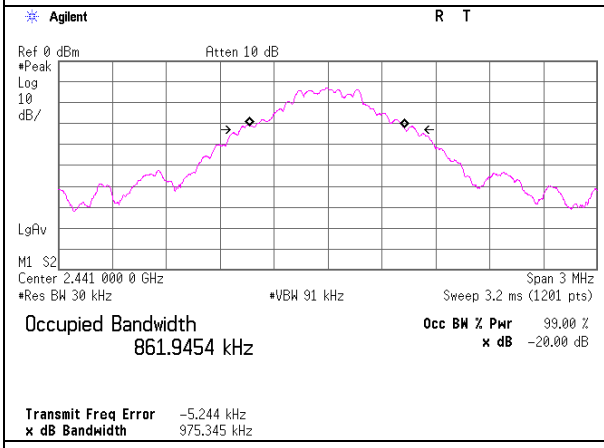
## Tx DH5

### 20dB Bandwidth

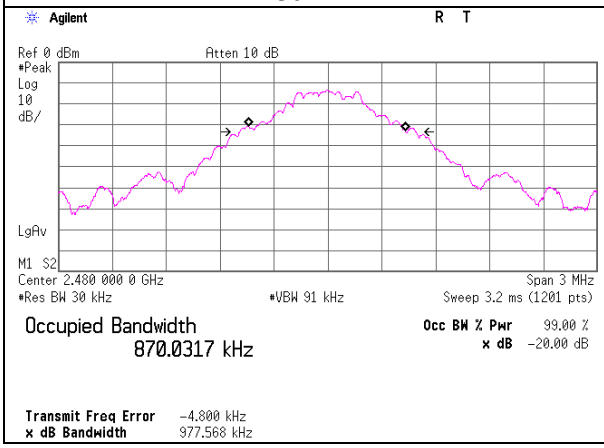
#### 2402MHz




#### 2441MHz

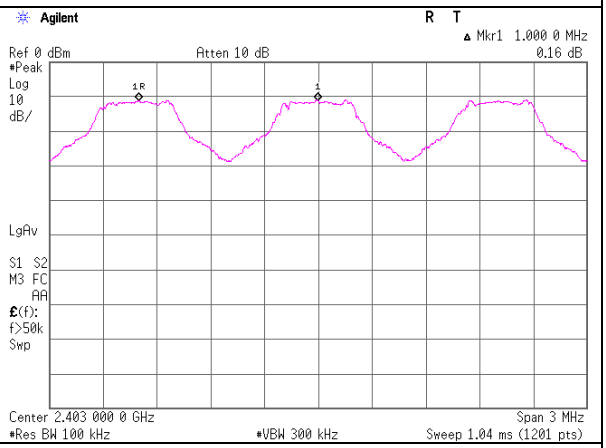



#### 2480MHz

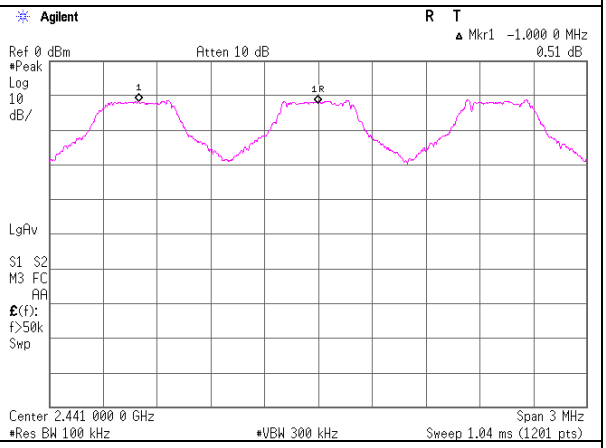



### Carrier Frequency Separation

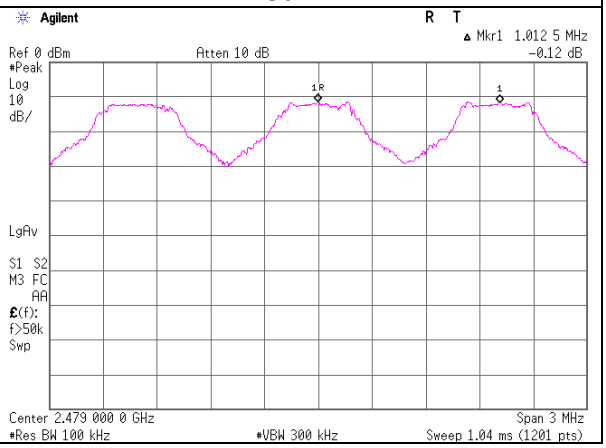
#### 2402MHz




#### 2441MHz




#### 2480MHz

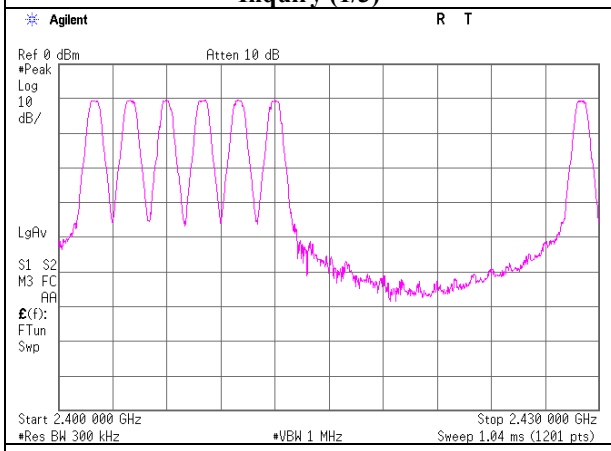


# Number of Hopping Frequency

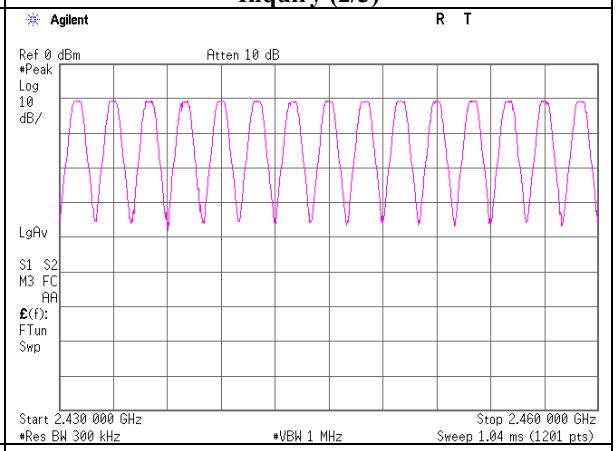
| | | |
|---|---|---|
| Test place | Head Office EMC Lab. No.6 Shielded Room | |
| Report No. | 29IE0011-HO-01 | |
| Date | 05/11/2009 | 06/02/2009 |
| Temperature/ Humidity | 25 deg.C./ 43% | 23 deg.C./ 61% |
| Engineer | Takeshi Choda | Hironobu Ohnishi |
| Mode | Tx (Hopping on) DH5/Inquiry | |

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

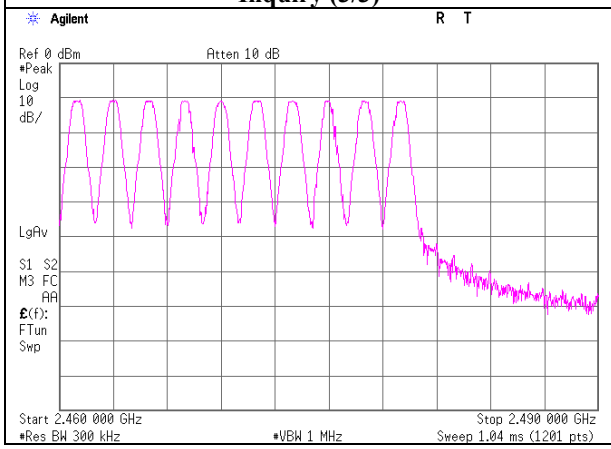
**Inquiry (1/3)**




**Inquiry (2/3)**




**Inquiry (3/3)**

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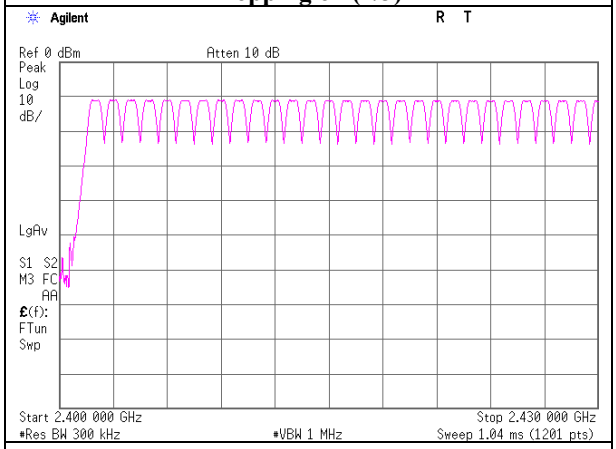
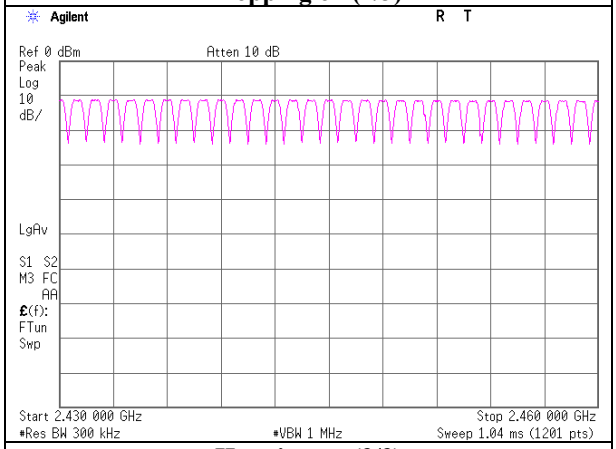
# Number of Hopping Frequency

**Tx DH5**

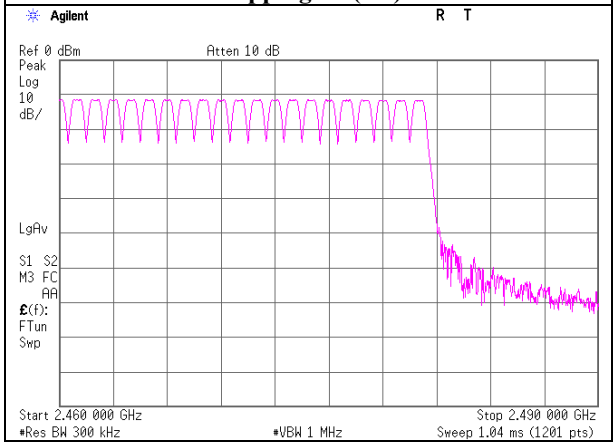
**Hopping on (1/3)**




**Hopping on (2/3)**




**Hopping on (3/3)**

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# Dwell time

| | | |
|---|---|---|
| Test place | Head Office EMC Lab. No.6 Shielded Room | |
| Report No. | 29IE0011-HO-01 | |
| Date | 05/11/2009 | 06/02/2009 |
| Temperature/ Humidity | 25 deg.C./ 43% | 23 deg.C./ 61% |
| Engineer | Takeshi Choda | Hironobu Ohnishi |
| Mode | Tx (Hopping on) DH5/Inquiry | |

| Mode | Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8(32 Hopping x 0.4)second period | Length of transmission time [msec] | Result [msec] | Limit [msec] |
|---|---|---|---|---|
| DH1 | 48.8 times / 5 sec. x 31.6 sec. = 309 times | 0.432 | 133 | 400 |
| DH3 | 24.8 times / 5 sec. x 31.6 sec. = 157 times | 1.687 | 265 | 400 |
| DH5 | 20.0 times / 5 sec. x 31.6 sec. = 127 times | 2.945 | 374 | 400 |
| Inquiry | 100.0 times / 1 sec. x 12.8 sec. = 1280 times | 0.133 | 171 | 400 |

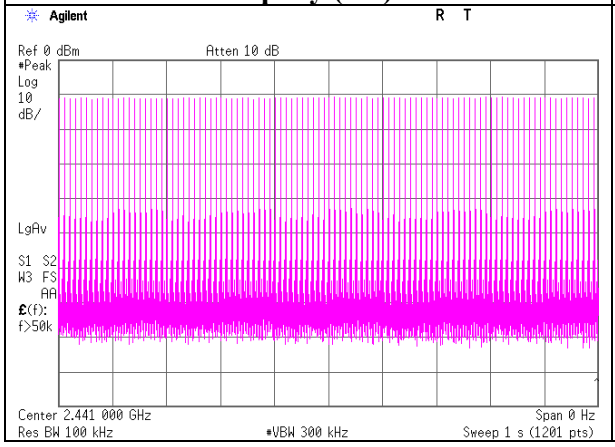
Sample Calculation
Result = Number of transmission x Length of transmition time

*Average data of 5 tests.(except Inquiry)

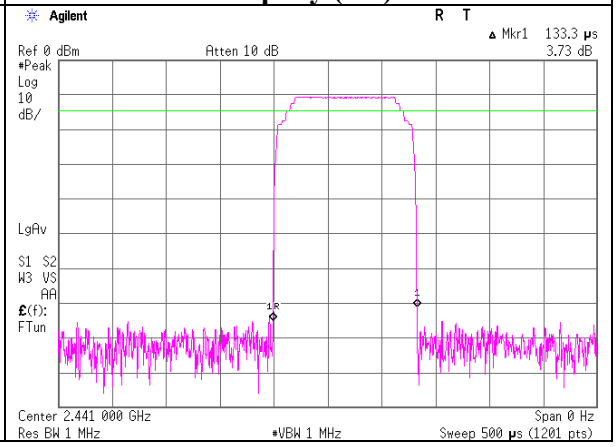
| Mode | Sampling [times] | | | | | Average [times] |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | |
| DH1 | 50 | 47 | 50 | 47 | 50 | 48.8 |
| DH3 | 23 | 24 | 27 | 25 | 25 | 24.8 |
| DH5 | 19 | 25 | 21 | 21 | 14 | 20.0 |

Sample Calculation
Average= Summation(Sampling 1 to 5) / 5

## Inquiry (1/2)

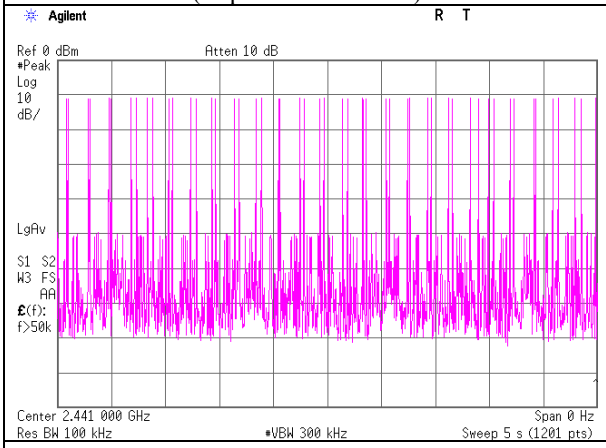



## Inquiry (2/2)

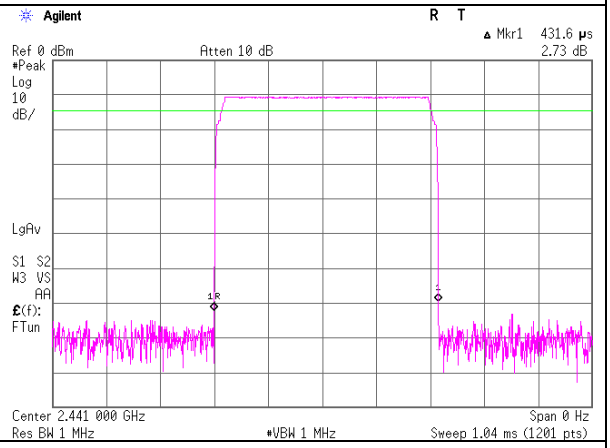


# Dwell time

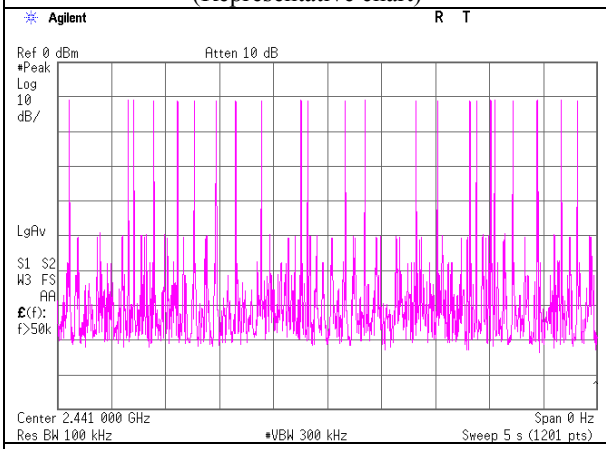
## DH1 (1/2)
(Representative chart)



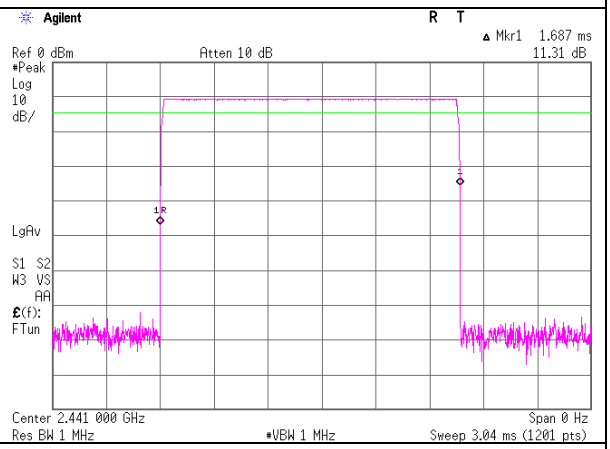

## DH1 (2/2)



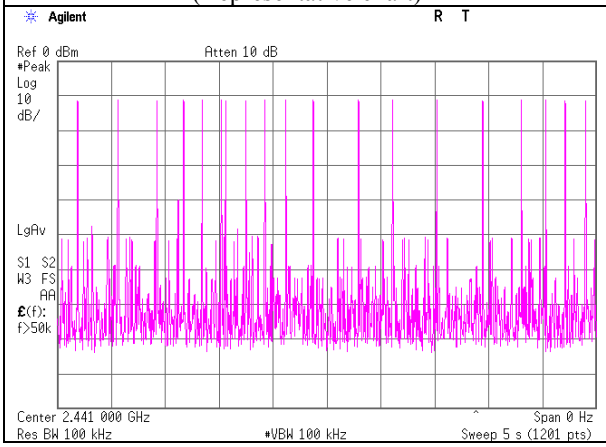

## DH3 (1/2)
(Representative chart)



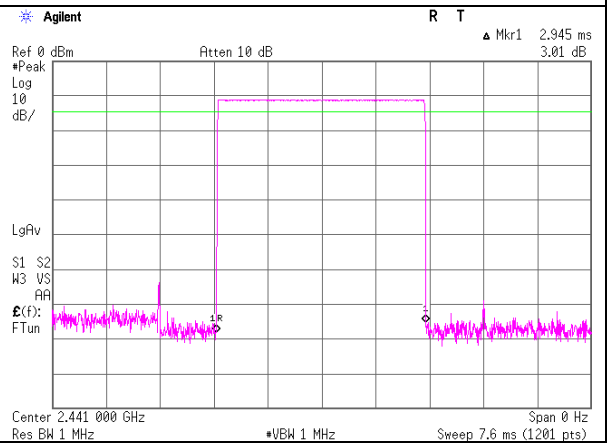

## DH3 (2/2)




## DH5 (1/2)
(Representative chart)




## DH5 (2/2)



# Maximum Peak Output Power

| | | |
|---|---|---|
| Test place | Head Office EMC Lab. No.6 Shielded Room | |
| Report No. | 29IE0011-HO-01 | |
| Date | 05/11/2009 | 06/02/2009 |
| Temperature/ Humidity | 25 deg.C./ 43% | 23 deg.C./ 61% |
| Engineer | Takeshi Choda | Hironobu Ohnishi |
| Mode | Tx (Hopping off) DH5/Inquiry | |

| Mode | Freq. | Reading | Cable Loss | Atten. | Result | | Limit | | Margin |
|---|---|---|---|---|---|---|---|---|---|
| | [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| DH5 | 2402.0 | -10.90 | 2.15 | 10.09 | 1.34 | 1.36 | 20.97 | 125 | 19.63 |
| DH5 | 2441.0 | -10.99 | 2.17 | 10.09 | 1.27 | 1.34 | 20.97 | 125 | 19.70 |
| DH5 | 2480.0 | -11.27 | 2.18 | 10.09 | 1.00 | 1.26 | 20.97 | 125 | 19.97 |
| Inquiry | 2441.0 | -10.91 | 2.17 | 10.09 | 1.35 | 1.36 | 20.97 | 125 | 19.62 |

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.
However, the limit level 125mWof AFH mode was used for the test.

# Radiated Spurious Emission

| | | |
|---|---|---|
| Test place | Head Office EMC Lab. No.3 and 4 Semi Anechoic Chamber | |
| Report No. | 29IE0011-HO-01 | |
| Date | 04/27/2009 | 05/02/2009 |
| Temperature/ Humidity | 22 deg.C./ 34% | 21 deg.C./ 40% |
| Engineer | Hironobu Ohnishi | Hironobu Ohnishi |
| | (1-18GHz) | (below 1GHz and above 18GHz) |
| | No.3 Semi Anechoic Chamber | No. 4 Semi Anechoic Chamber |
| Mode | Tx, DH5 2402MHz | |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 85.379 | QP | 51.2 | 7.1 | 7.9 | 32.0 | 34.2 | 40.0 | 5.8 | |
| Hori | 189.642 | QP | 33.6 | 16.2 | 8.9 | 32.0 | 26.7 | 43.5 | 16.8 | |
| Hori | 287.522 | QP | 42.1 | 19.5 | 9.7 | 31.9 | 39.4 | 46.0 | 6.6 | |
| Hori | 311.992 | QP | 43.6 | 16.5 | 9.9 | 31.9 | 38.1 | 46.0 | 7.9 | |
| Hori | 336.462 | QP | 43.2 | 16.9 | 10.1 | 32.0 | 38.2 | 46.0 | 7.8 | |
| Hori | 385.401 | QP | 36.6 | 17.6 | 10.4 | 32.0 | 32.6 | 46.0 | 13.4 | |
| Hori | 1144.017 | PK | 47.1 | 24.6 | 2.0 | 34.5 | 39.2 | 73.9 | 34.7 | |
| Hori | 2390.000 | PK | 47.3 | 26.7 | 2.7 | 32.3 | 44.4 | 73.9 | 29.5 | |
| Hori | 2400.000 | PK | 63.0 | 26.7 | 2.7 | 32.3 | 60.1 | 73.9 | 13.8 | |
| Hori | 4804.000 | PK | 43.3 | 31.2 | 4.7 | 31.4 | 47.8 | 73.9 | 26.1 | |
| Hori | 7206.000 | PK | 43.1 | 35.6 | 5.6 | 31.9 | 52.4 | 73.9 | 21.5 | |
| Hori | 24020.000 | PK | 42.9 | 38.6 | -1.1 | 32.5 | 47.9 | 73.9 | 26.0 | |
| Hori | 1144.017 | AV | 39.5 | 24.6 | 2.0 | 34.5 | 31.6 | 53.9 | 22.3 | VBW=270Hz |
| Hori | 2390.000 | AV | 28.8 | 26.7 | 2.7 | 32.3 | 25.9 | 53.9 | 28.1 | VBW=270Hz |
| Hori | 2400.000 | AV | 35.3 | 26.7 | 2.7 | 32.3 | 32.4 | 53.9 | 21.5 | VBW=270Hz |
| Hori | 4804.000 | AV | 35.3 | 31.2 | 4.7 | 31.4 | 39.8 | 53.9 | 14.1 | VBW=270Hz |
| Hori | 7206.000 | AV | 33.1 | 35.6 | 5.6 | 31.9 | 42.4 | 53.9 | 11.5 | VBW=270Hz |
| Hori | 24020.000 | AV | 31.0 | 38.6 | -1.1 | 32.5 | 36.0 | 53.9 | 17.9 | VBW=270Hz |
| Vert | 85.379 | QP | 45.5 | 7.1 | 7.9 | 32.0 | 28.5 | 40.0 | 11.5 | |
| Vert | 189.642 | QP | 24.3 | 16.2 | 8.9 | 32.0 | 17.4 | 43.5 | 26.1 | |
| Vert | 287.522 | QP | 32.9 | 19.5 | 9.7 | 31.9 | 30.2 | 46.0 | 15.8 | |
| Vert | 311.992 | QP | 27.6 | 16.5 | 9.9 | 31.9 | 22.1 | 46.0 | 23.9 | |
| Vert | 336.462 | QP | 32.3 | 16.9 | 10.1 | 32.0 | 27.3 | 46.0 | 18.7 | |
| Vert | 385.401 | QP | 33.9 | 17.6 | 10.4 | 32.0 | 29.9 | 46.0 | 16.1 | |
| Vert | 1144.017 | PK | 53.3 | 24.6 | 2.0 | 34.5 | 45.4 | 73.9 | 28.5 | |
| Vert | 2390.000 | PK | 43.6 | 26.7 | 2.7 | 32.3 | 40.7 | 73.9 | 33.2 | |
| Vert | 2400.000 | PK | 58.9 | 26.7 | 2.7 | 32.3 | 56.0 | 73.9 | 18.0 | |
| Vert | 4804.000 | PK | 43.9 | 31.2 | 4.7 | 31.4 | 48.4 | 73.9 | 25.5 | |
| Vert | 7206.000 | PK | 43.7 | 35.6 | 5.6 | 31.9 | 53.0 | 73.9 | 20.9 | |
| Vert | 24020.000 | PK | 43.5 | 38.6 | -1.1 | 32.5 | 48.5 | 73.9 | 25.4 | |
| Vert | 1144.017 | AV | 49.1 | 24.6 | 2.0 | 34.5 | 41.2 | 53.9 | 12.7 | VBW=270Hz |
| Vert | 2390.000 | AV | 28.4 | 26.7 | 2.7 | 32.3 | 25.5 | 53.9 | 28.4 | VBW=270Hz |
| Vert | 2400.000 | AV | 32.7 | 26.7 | 2.7 | 32.3 | 29.8 | 53.9 | 24.1 | VBW=270Hz |
| Vert | 4804.000 | AV | 37.2 | 31.2 | 4.7 | 31.4 | 41.7 | 53.9 | 12.2 | VBW=270Hz |
| Vert | 7206.000 | AV | 34.5 | 35.6 | 5.6 | 31.9 | 43.8 | 53.9 | 10.1 | VBW=270Hz |
| Vert | 24020.000 | AV | 30.8 | 38.6 | -1.1 | 32.5 | 35.8 | 53.9 | 18.1 | VBW=270Hz |

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

*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
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

# Radiated Spurious Emission

| | | |
|---|---|---|
| Test place | Head Office EMC Lab. No.3 and 4 Semi Anechoic Chamber | |
| Report No. | 29IE0011-HO-01 | |
| Date | 04/27/2009 | 05/02/2009 |
| Temperature/ Humidity | 22 deg.C./ 34% | 21 deg.C./ 40% |
| Engineer | Hironobu Ohnishi | Hironobu Ohnishi |
| | (1-18GHz) | (below 1GHz and above 18GHz) |
| | No.3 Semi Anechoic Chamber | No. 4 Semi Anechoic Chamber |
| Mode | Tx, DH5 2441MHz | |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 85.379 | QP | 51.3 | 7.1 | 7.9 | 32.0 | 34.3 | 40.0 | 5.7 | |
| Hori | 189.642 | QP | 33.8 | 16.2 | 8.9 | 32.0 | 26.9 | 43.5 | 16.6 | |
| Hori | 287.522 | QP | 41.8 | 19.5 | 9.7 | 31.9 | 39.1 | 46.0 | 6.9 | |
| Hori | 311.992 | QP | 43.7 | 16.5 | 9.9 | 31.9 | 38.2 | 46.0 | 7.8 | |
| Hori | 336.462 | QP | 42.5 | 16.9 | 10.1 | 32.0 | 37.5 | 46.0 | 8.5 | |
| Hori | 385.401 | QP | 36.5 | 17.6 | 10.4 | 32.0 | 32.5 | 46.0 | 13.5 | |
| Hori | 1144.017 | PK | 45.5 | 24.6 | 2.0 | 34.5 | 37.6 | 73.9 | 36.3 | |
| Hori | 4882.000 | PK | 44.8 | 31.3 | 4.6 | 31.4 | 49.3 | 73.9 | 24.6 | |
| Hori | 7323.000 | PK | 43.6 | 35.8 | 5.6 | 32.0 | 53.0 | 73.9 | 20.9 | |
| Hori | 9764.000 | PK | 41.7 | 38.4 | 6.6 | 32.7 | 54.0 | 73.9 | 19.9 | |
| Hori | 24410.000 | PK | 41.7 | 38.9 | -1.1 | 32.3 | 47.2 | 73.9 | 26.7 | |
| Hori | 1144.017 | AV | 38.8 | 24.6 | 2.0 | 34.5 | 30.9 | 53.9 | 23.0 | VBW=270Hz |
| Hori | 4882.000 | AV | 39.2 | 31.3 | 4.6 | 31.4 | 43.7 | 53.9 | 10.2 | VBW=270Hz |
| Hori | 7323.000 | AV | 33.2 | 35.8 | 5.6 | 32.0 | 42.6 | 53.9 | 11.3 | VBW=270Hz |
| Hori | 9764.000 | AV | 29.7 | 38.4 | 6.6 | 32.7 | 42.0 | 53.9 | 11.9 | VBW=270Hz |
| Hori | 24410.000 | AV | 29.7 | 38.9 | -1.1 | 32.3 | 35.2 | 53.9 | 18.7 | VBW=270Hz |
| Vert | 85.379 | QP | 45.3 | 7.1 | 7.9 | 32.0 | 28.3 | 40.0 | 11.7 | |
| Vert | 189.642 | QP | 24.4 | 16.2 | 8.9 | 32.0 | 17.5 | 43.5 | 26.0 | |
| Vert | 287.522 | QP | 33.0 | 19.5 | 9.7 | 31.9 | 30.3 | 46.0 | 15.7 | |
| Vert | 311.992 | QP | 32.5 | 16.5 | 9.9 | 31.9 | 27.0 | 46.0 | 19.0 | |
| Vert | 336.462 | QP | 32.5 | 16.9 | 10.1 | 32.0 | 27.5 | 46.0 | 18.5 | |
| Vert | 385.401 | QP | 32.9 | 17.6 | 10.4 | 32.0 | 28.9 | 46.0 | 17.1 | |
| Vert | 1144.017 | PK | 52.2 | 24.6 | 2.0 | 34.5 | 44.3 | 73.9 | 29.6 | |
| Vert | 4882.000 | PK | 46.0 | 31.3 | 4.6 | 31.4 | 50.5 | 73.9 | 23.4 | |
| Vert | 7323.000 | PK | 44.1 | 35.8 | 5.6 | 32.0 | 53.5 | 73.9 | 20.4 | |
| Vert | 9764.000 | PK | 42.1 | 38.4 | 6.6 | 32.7 | 54.4 | 73.9 | 19.5 | |
| Vert | 24410.000 | PK | 41.7 | 38.9 | -1.1 | 32.3 | 47.2 | 73.9 | 26.7 | |
| Vert | 1144.017 | AV | 48.9 | 24.6 | 2.0 | 34.5 | 41.0 | 53.9 | 12.9 | VBW=270Hz |
| Vert | 4882.000 | AV | 40.8 | 31.3 | 4.6 | 31.4 | 45.3 | 53.9 | 8.6 | VBW=270Hz |
| Vert | 7323.000 | AV | 34.5 | 35.8 | 5.6 | 32.0 | 43.9 | 53.9 | 10.0 | VBW=270Hz |
| Vert | 9764.000 | AV | 30.1 | 38.4 | 6.6 | 32.7 | 42.4 | 53.9 | 11.5 | VBW=270Hz |
| Vert | 24410.000 | AV | 29.9 | 38.9 | -1.1 | 32.3 | 35.4 | 53.9 | 18.5 | VBW=270Hz |

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

*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
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

# Radiated Spurious Emission

| | | |
|---|---|---|
| Test place | Head Office EMC Lab. No.3 and 4 Semi Anechoic Chamber | |
| Report No. | 29IE0011-HO-01 | |
| Date | 04/27/2009 | 05/02/2009 |
| Temperature/ Humidity | 22 deg.C./ 34% | 21 deg.C./ 40% |
| Engineer | Hironobu Ohnishi | Hironobu Ohnishi |
| | (1-18GHz) | (below 1GHz and above 18GHz) |
| | No.3 Semi Anechoic Chamber | No. 4 Semi Anechoic Chamber |
| Mode | Tx, DH5 2480MHz | |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 85.379 | QP | 51.5 | 7.1 | 7.9 | 32.0 | 34.5 | 40.0 | 5.5 | |
| Hori | 189.642 | QP | 33.8 | 16.2 | 8.9 | 32.0 | 26.9 | 43.5 | 16.6 | |
| Hori | 287.522 | QP | 41.8 | 19.5 | 9.7 | 31.9 | 39.1 | 46.0 | 6.9 | |
| Hori | 311.992 | QP | 44.2 | 16.5 | 9.9 | 31.9 | 38.7 | 46.0 | 7.3 | |
| Hori | 336.462 | QP | 42.6 | 16.9 | 10.1 | 32.0 | 37.6 | 46.0 | 8.4 | |
| Hori | 385.401 | QP | 36.5 | 17.6 | 10.4 | 32.0 | 32.5 | 46.0 | 13.5 | |
| Hori | 1144.017 | PK | 46.0 | 24.6 | 2.0 | 34.5 | 38.1 | 73.9 | 35.8 | |
| Hori | 2483.500 | PK | 55.8 | 26.9 | 2.8 | 32.2 | 53.3 | 73.9 | 20.6 | |
| Hori | 4960.000 | PK | 46.6 | 31.5 | 4.6 | 31.4 | 51.3 | 73.9 | 22.6 | |
| Hori | 7440.000 | PK | 43.8 | 36.0 | 5.6 | 32.0 | 53.4 | 73.9 | 20.5 | |
| Hori | 9920.000 | PK | 43.1 | 38.5 | 6.8 | 32.7 | 55.7 | 73.9 | 18.2 | |
| Hori | 24800.000 | PK | 44.3 | 39.2 | -1.0 | 32.2 | 50.3 | 73.9 | 23.6 | |
| Hori | 1144.017 | AV | 39.5 | 24.6 | 2.0 | 34.5 | 31.6 | 53.9 | 22.3 | VBW=270Hz |
| Hori | 2483.500 | AV | 30.4 | 26.9 | 2.8 | 32.2 | 27.9 | 53.9 | 26.0 | VBW=270Hz |
| Hori | 4960.000 | AV | 41.1 | 31.5 | 4.6 | 31.4 | 45.8 | 53.9 | 8.1 | VBW=270Hz |
| Hori | 7440.000 | AV | 32.8 | 36.0 | 5.6 | 32.0 | 42.4 | 53.9 | 11.5 | VBW=270Hz |
| Hori | 9920.000 | AV | 30.5 | 38.5 | 6.8 | 32.7 | 43.1 | 53.9 | 10.8 | VBW=270Hz |
| Hori | 24800.000 | AV | 32.2 | 39.2 | -1.0 | 32.2 | 38.2 | 53.9 | 15.7 | VBW=270Hz |
| Vert | 85.379 | QP | 45.1 | 7.1 | 7.9 | 32.0 | 28.1 | 40.0 | 11.9 | |
| Vert | 189.642 | QP | 26.0 | 16.2 | 8.9 | 32.0 | 19.1 | 43.5 | 24.4 | |
| Vert | 287.522 | QP | 34.4 | 19.5 | 9.7 | 31.9 | 31.7 | 46.0 | 14.3 | |
| Vert | 311.992 | QP | 30.1 | 16.5 | 9.9 | 31.9 | 24.6 | 46.0 | 21.4 | |
| Vert | 336.462 | QP | 31.5 | 16.9 | 10.1 | 32.0 | 26.5 | 46.0 | 19.5 | |
| Vert | 385.401 | QP | 32.5 | 17.6 | 10.4 | 32.0 | 28.5 | 46.0 | 17.5 | |
| Vert | 1144.017 | PK | 53.8 | 24.6 | 2.0 | 34.5 | 45.9 | 73.9 | 28.0 | |
| Vert | 2483.500 | PK | 51.8 | 26.9 | 2.8 | 32.2 | 49.3 | 73.9 | 24.6 | |
| Vert | 4960.000 | PK | 49.1 | 31.5 | 4.6 | 31.4 | 53.8 | 73.9 | 20.1 | |
| Vert | 7440.000 | PK | 45.1 | 36.0 | 5.6 | 32.0 | 54.7 | 73.9 | 19.2 | |
| Vert | 9920.000 | PK | 43.7 | 38.5 | 6.8 | 32.7 | 56.3 | 73.9 | 17.6 | |
| Vert | 24800.000 | PK | 44.8 | 39.2 | -1.0 | 32.2 | 50.8 | 73.9 | 23.1 | |
| Vert | 1144.017 | AV | 49.1 | 24.6 | 2.0 | 34.5 | 41.2 | 53.9 | 12.7 | VBW=270Hz |
| Vert | 2483.500 | AV | 29.6 | 26.9 | 2.8 | 32.2 | 27.1 | 53.9 | 26.8 | VBW=270Hz |
| Vert | 4960.000 | AV | 44.9 | 31.5 | 4.6 | 31.4 | 49.6 | 53.9 | 4.3 | VBW=270Hz |
| Vert | 7440.000 | AV | 34.5 | 36.0 | 5.6 | 32.0 | 44.1 | 53.9 | 9.8 | VBW=270Hz |
| Vert | 9920.000 | AV | 31.2 | 38.5 | 6.8 | 32.7 | 43.8 | 53.9 | 10.1 | VBW=270Hz |
| Vert | 24800.000 | AV | 32.0 | 39.2 | -1.0 | 32.2 | 38.0 | 53.9 | 15.9 | VBW=270Hz |

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

*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
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

# Radiated Spurious Emission

| | | |
|---|---|---|
| Test place | Head Office EMC Lab. No.3 and 4 Semi Anechoic Chamber | |
| Report No. | 29IE0011-HO-01 | |
| Date | 04/27/2009 | 05/02/2009 |
| Temperature/ Humidity | 22 deg.C./ 34% | 21 deg.C./ 40% |
| Engineer | Hironobu Ohnishi | Hironobu Ohnishi |
| | (1-10GHz) | (below 1GHz) |
| | No.3 Semi Anechoic Chamber | No. 4 Semi Anechoic Chamber |
| Mode | Rx, 2441MHz | |

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| Hori | 85.379 | QP | 48.3 | 7.1 | 7.9 | 32.0 | 31.3 | 40.0 | 8.7 | |
| Hori | 189.642 | QP | 34.1 | 16.2 | 8.9 | 32.0 | 27.2 | 43.5 | 16.3 | |
| Hori | 287.522 | QP | 41.7 | 19.5 | 9.7 | 31.9 | 39.0 | 46.0 | 7.0 | |
| Hori | 311.992 | QP | 43.7 | 16.5 | 9.9 | 31.9 | 38.2 | 46.0 | 7.8 | |
| Hori | 336.462 | QP | 42.8 | 16.9 | 10.1 | 32.0 | 37.8 | 46.0 | 8.2 | |
| Hori | 385.401 | QP | 36.6 | 17.6 | 10.4 | 32.0 | 32.6 | 46.0 | 13.4 | |
| Hori | 1144.017 | PK | 45.9 | 24.6 | 2.0 | 34.5 | 38.0 | 73.9 | 35.9 | |
| Hori | 2441.000 | PK | 40.7 | 26.8 | 2.8 | 32.3 | 38.0 | 73.9 | 35.9 | No signal detect. |
| Hori | 1144.017 | AV | 33.3 | 24.6 | 2.0 | 34.5 | 25.4 | 53.9 | 28.5 | VBW=10Hz |
| Hori | 2441.000 | AV | 27.5 | 26.8 | 2.8 | 32.3 | 24.8 | 53.9 | 29.1 | VBW=10Hz, No signal detect. |
| Vert | 85.379 | QP | 42.0 | 7.1 | 7.9 | 32.0 | 25.0 | 40.0 | 15.0 | |
| Vert | 189.642 | QP | 27.3 | 16.2 | 8.9 | 32.0 | 20.4 | 43.5 | 23.1 | |
| Vert | 287.522 | QP | 33.5 | 19.5 | 9.7 | 31.9 | 30.8 | 46.0 | 15.2 | |
| Vert | 311.992 | QP | 29.1 | 16.5 | 9.9 | 31.9 | 23.6 | 46.0 | 22.4 | |
| Vert | 336.462 | QP | 31.8 | 16.9 | 10.1 | 32.0 | 26.8 | 46.0 | 19.2 | |
| Vert | 385.401 | QP | 33.4 | 17.6 | 10.4 | 32.0 | 29.4 | 46.0 | 16.6 | |
| Vert | 1144.017 | PK | 53.0 | 24.6 | 2.0 | 34.5 | 45.1 | 73.9 | 28.8 | |
| Vert | 2441.000 | PK | 41.0 | 26.8 | 2.8 | 32.3 | 38.3 | 73.9 | 35.6 | No signal detect. |
| Vert | 1144.017 | AV | 37.2 | 24.6 | 2.0 | 34.5 | 29.3 | 53.9 | 24.6 | VBW=10Hz |
| Vert | 2441.000 | AV | 27.6 | 26.8 | 2.8 | 32.3 | 24.9 | 53.9 | 29.0 | VBW=10Hz, No signal detect. |

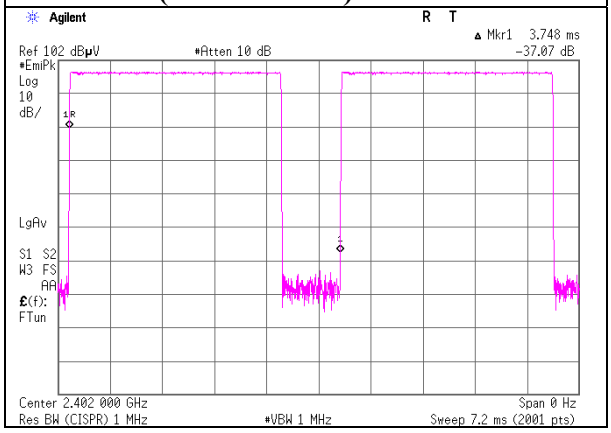
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

# VBW (AV) Calculation

**VBW: 1/x = 266.8Hz<270Hz**
**x: (Tx on+Tx off) =3.748ms**

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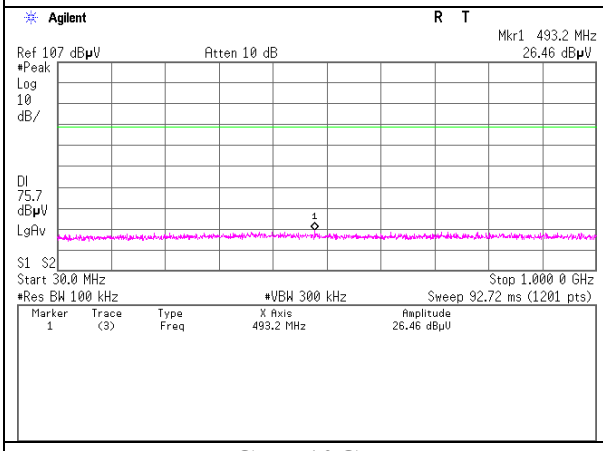
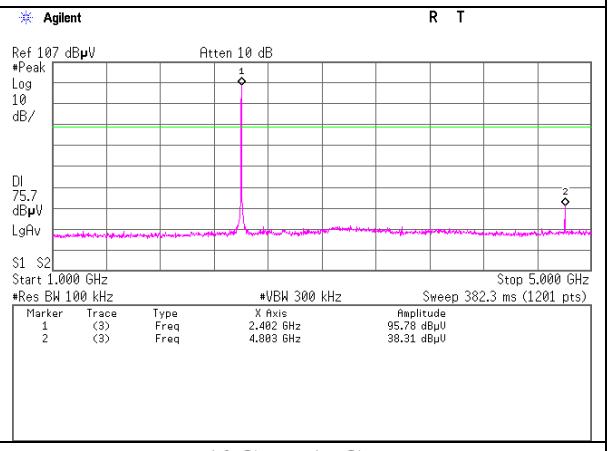
# Conducted Spurious Emission

## Tx DH5 2402MHz

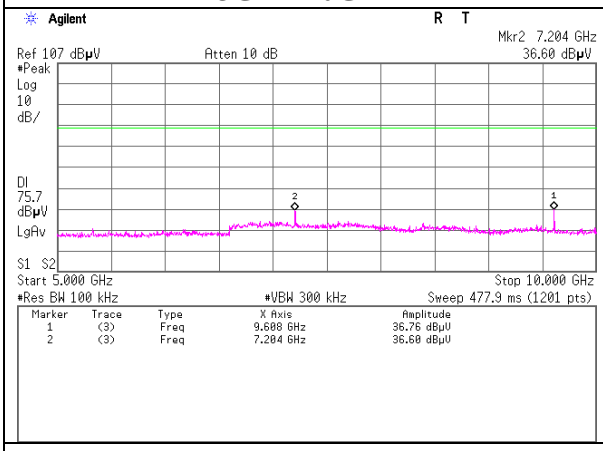
### 30MHz-1GHz



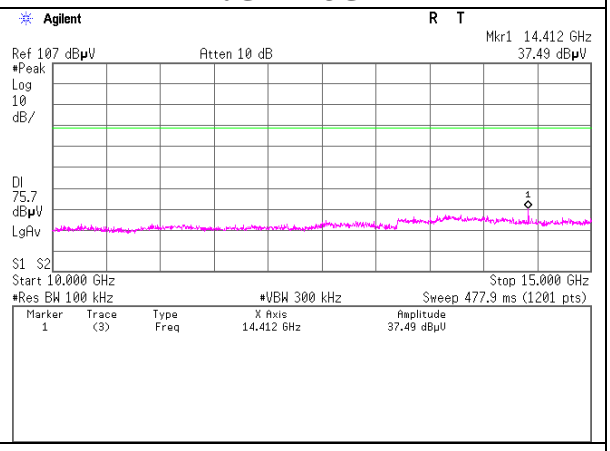

### 1GHz-5GHz



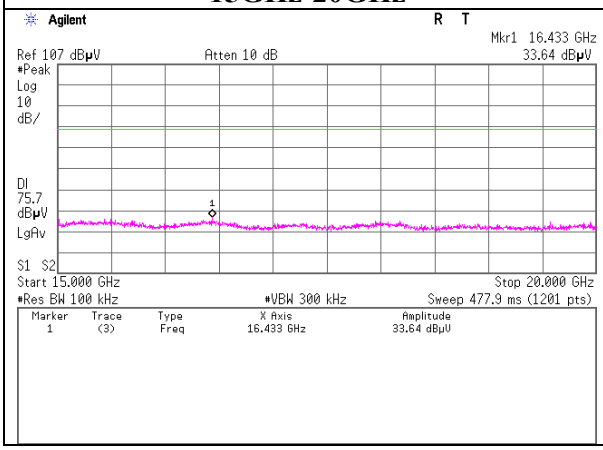

### 5GHz-10GHz



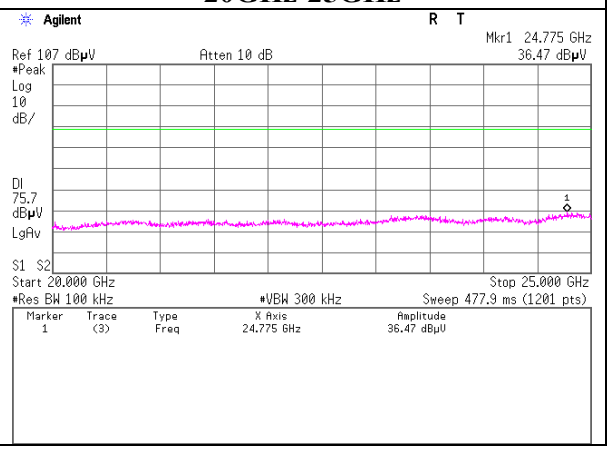

### 10GHz-15GHz




### 15GHz-20GHz




### 20GHz-25GHz

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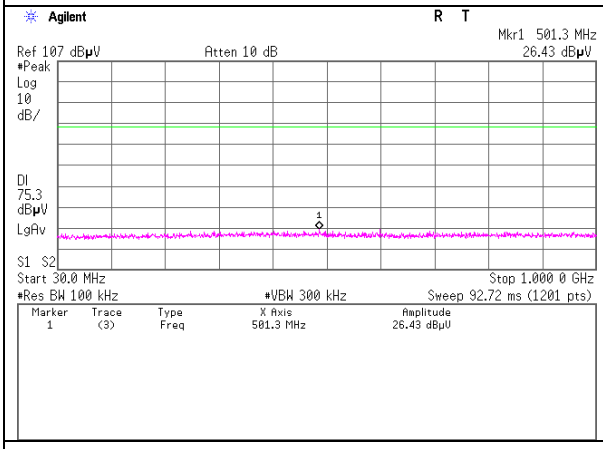
**Telephone : +81 596 24 8116**
**Facsimile : +81 596 24 8124**

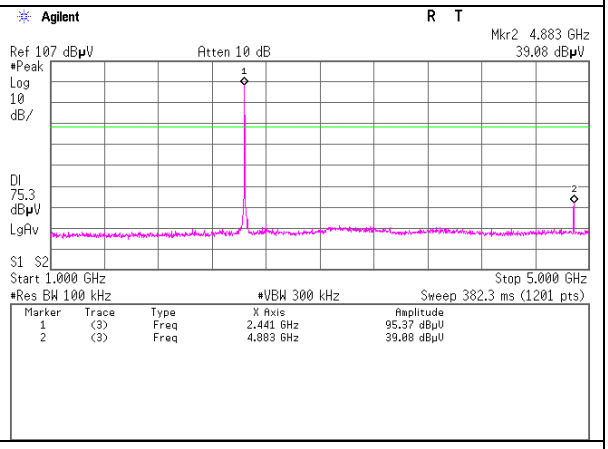
# Conducted Spurious Emission

## Tx DH5 2441MHz

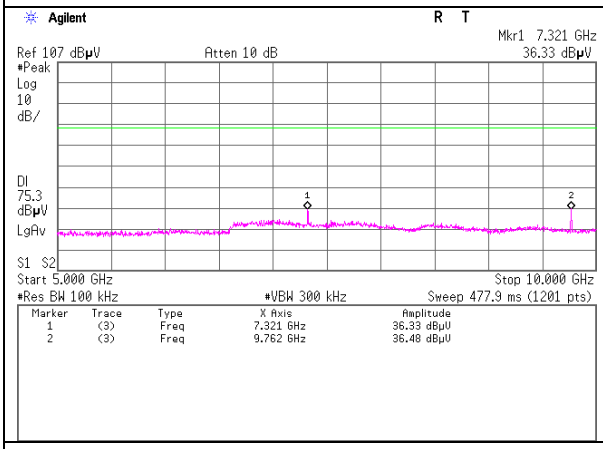
### 30MHz-1GHz



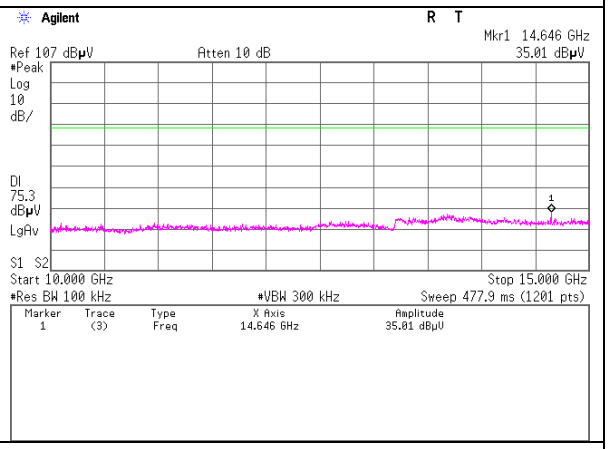

### 1GHz-5GHz



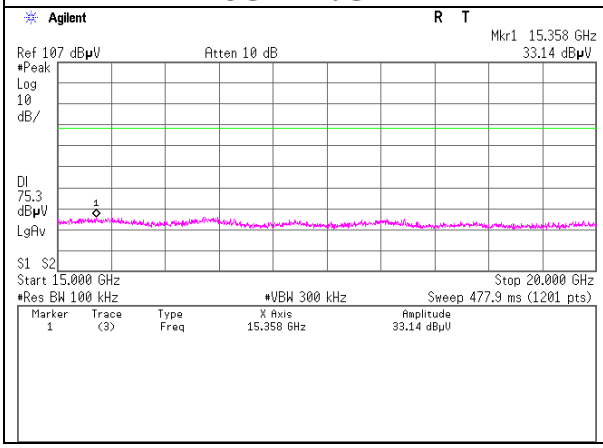

### 5GHz-10GHz



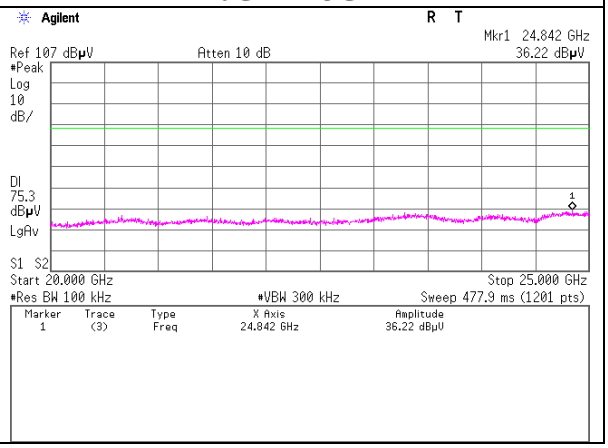

### 10GHz-15GHz




### 15GHz-20GHz




### 20GHz-25GHz

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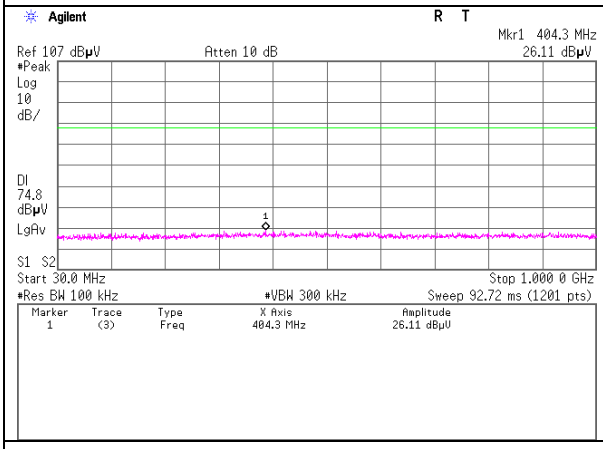
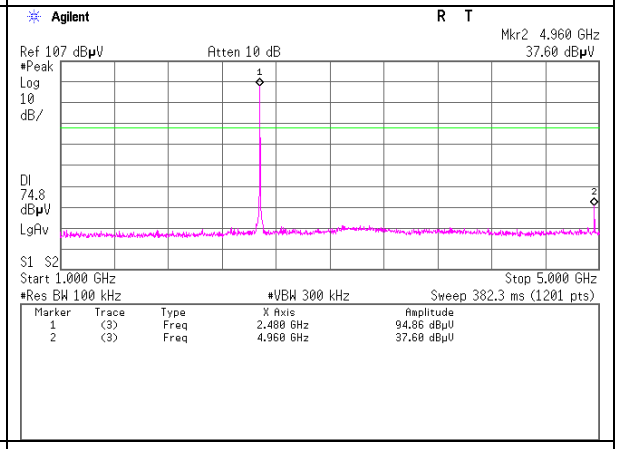
# Conducted Spurious Emission

## Tx DH5 2480MHz

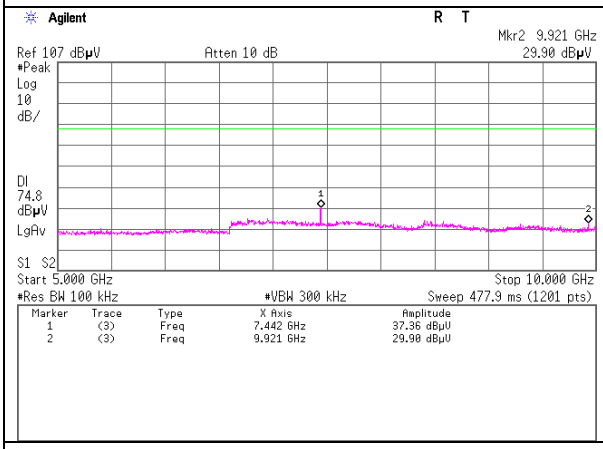
### 30MHz-1GHz



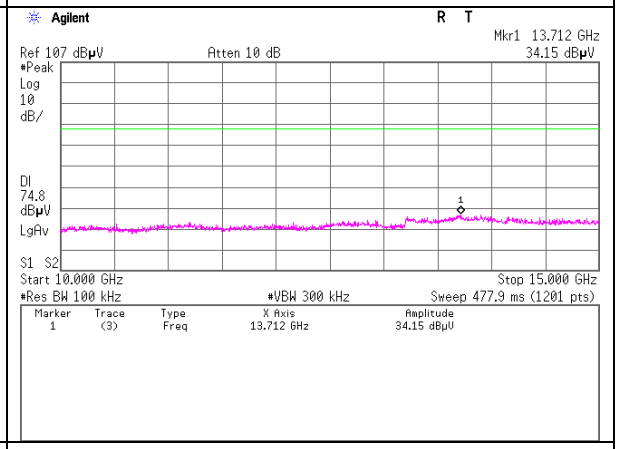

### 1GHz-5GHz



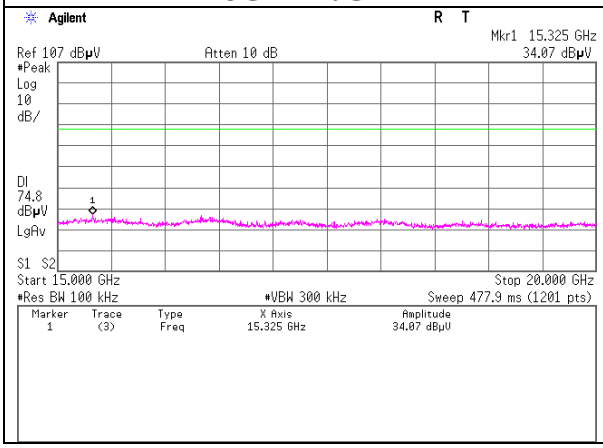

### 5GHz-10GHz



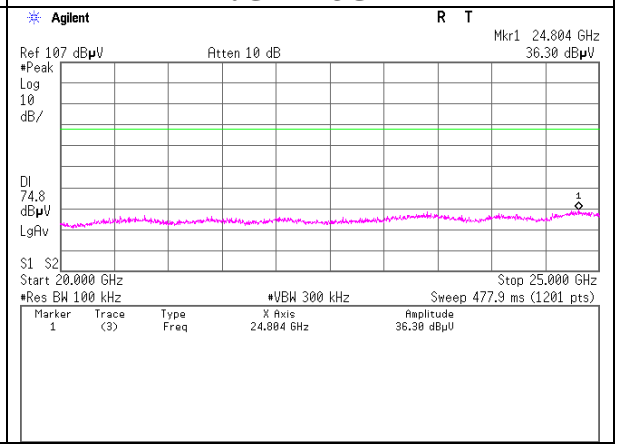

### 10GHz-15GHz




### 15GHz-20GHz




### 20GHz-25GHz

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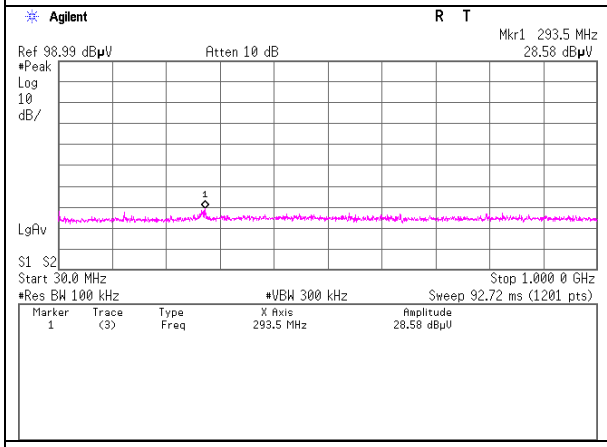
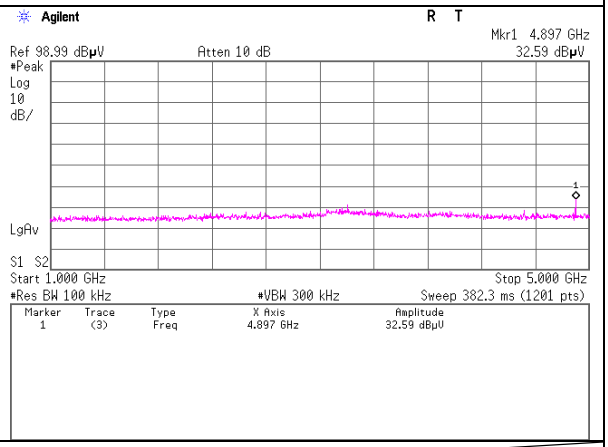
# Conducted Spurious Emission

## Rx 2441MHz

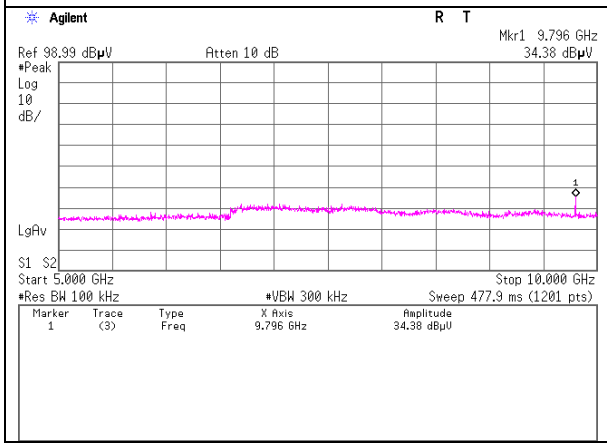
### 30MHz-1GHz




### 1GHz-5GHz




### 5GHz-10GHz

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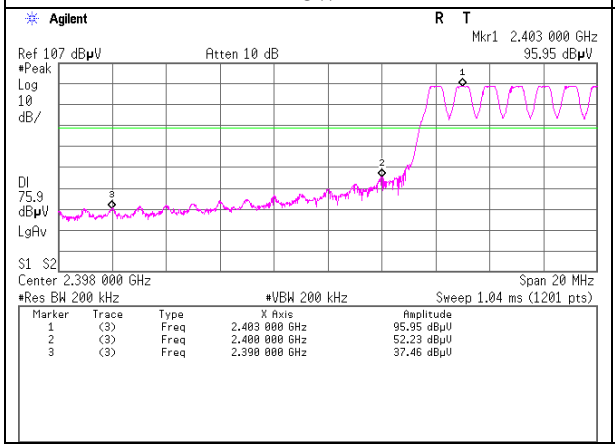
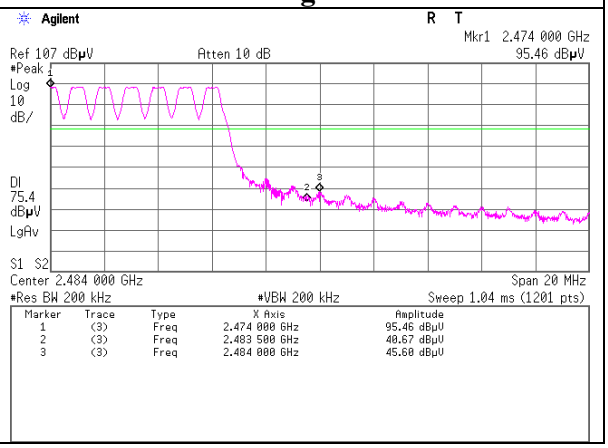
# Conducted Emission Band Edge compliance

## Tx DH5, Hopping on

### Low

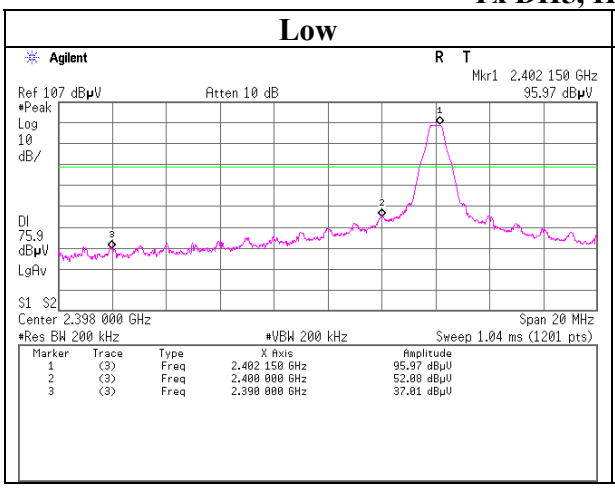



### High

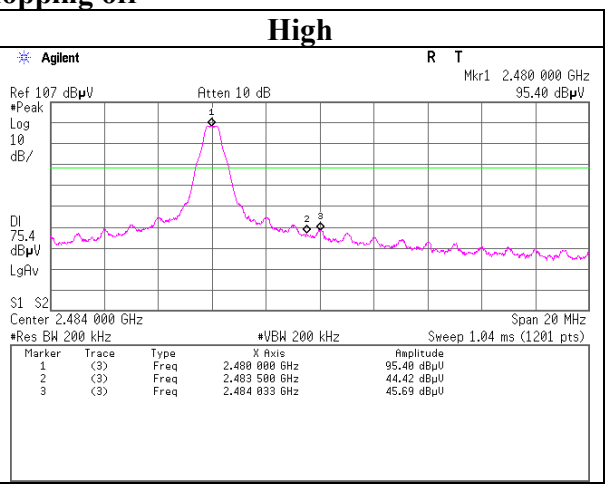



## Tx DH5, Hopping off

### Low




### High

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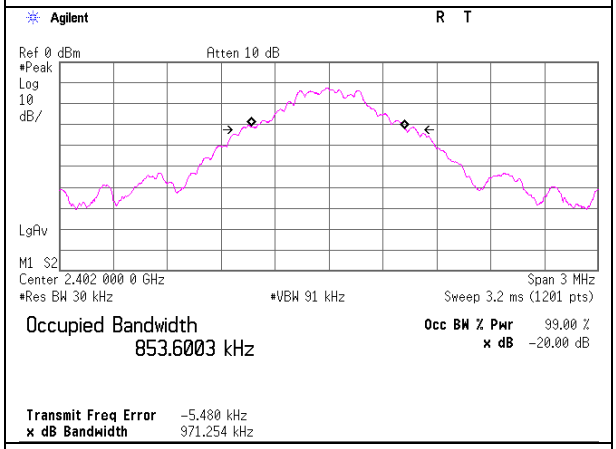
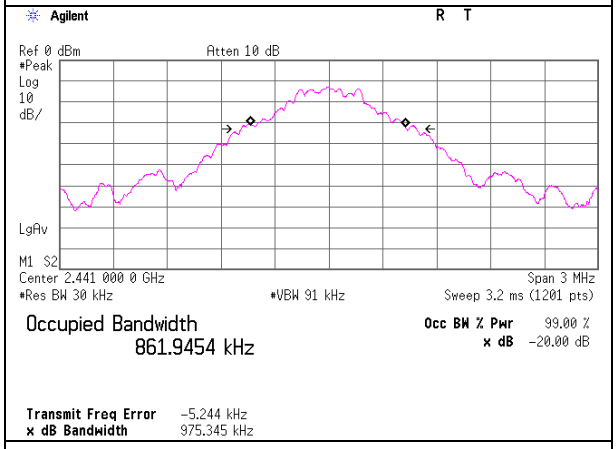
# 99%Occupied Bandwidth

## Tx DH5, Hopping off

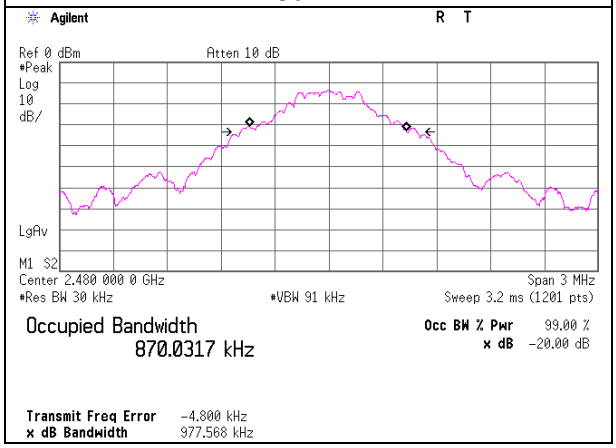
### 2402MHz




### 2441MHz

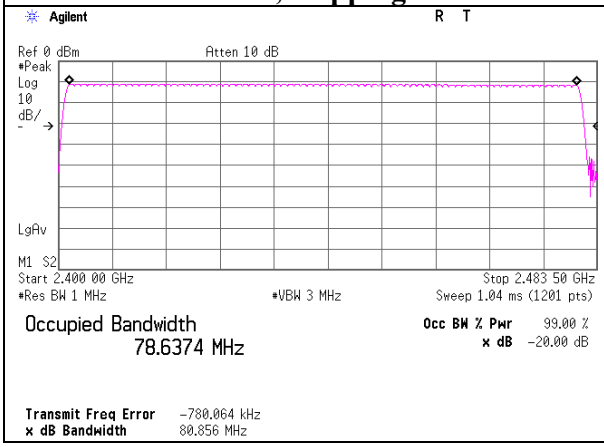



### 2480MHz

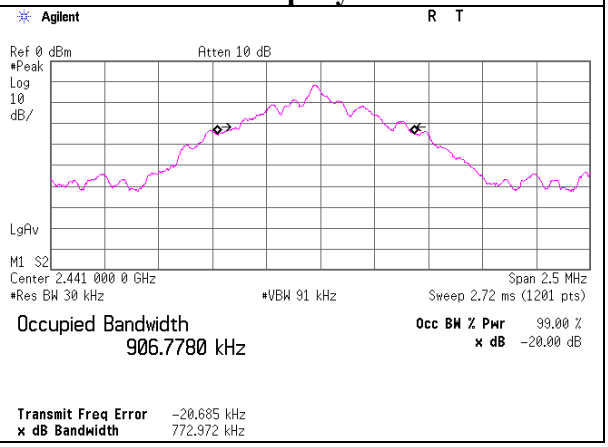


# 99% Occupied Bandwidth

## Tx DH5, Hopping on




## Inquiry

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# APPENDIX 3: Test instruments

**EMI test equipment**

| Control No. | Instrument | Manufacturer | Model No | Serial No | Test Item | Calibration Date * Interval(month) |
|---|---|---|---|---|---|---|
| MAEC-03 | Anechoic Chamber(NSA) | TDK | Semi Anechoic Chamber 3m | DA-10005 | RE | 2009/02/02 * 12 |
| MOS-13 | Thermo-Hygrometer | Custom | CTH-180 | - | RE | 2009/02/06 * 12 |
| MJM-06 | Measure | PROMART | SEN1955 | - | RE | - |
| COTS-MEMI | EMI measurement program | TSJ | TEPTO-DV | - | RE/CE | - |
| MSA-03 | Spectrum Analyzer | Agilent | E4448A | MY44020357 | RE | 2008/11/07 * 12 |
| MHA-20 | Horn Antenna 1-18GHz | Schwarzbeck | BBHA9120D | 258 | RE | 2009/04/30 * 12 |
| MCC-56 | Microwave Cable 1G-26.5GHz | Suhner | SUCOFLEX104 | 174410(1m) / 284655(5m) | RE | 2009/01/07 * 12 |
| MPA-11 | MicroWave System Amplifier | Agilent | 83017A | MY39500779 | RE | 2009/03/19 * 12 |
| MCC-78 | Microwave Cable 1G-26.5GHz | Suhner | SUCOFLEX104 | 278993/4 | RE | 2008/12/17 * 12 |
| MHF-19 | High Pass Filter 3.5-18.0GHz | TOKIMEC | TF323DCA | 602 | RE | 2008/12/16 * 12 |
| MAEC-04 | Anechoic Chamber(NSA) | TDK | Semi Anechoic Chamber 3m | DA-10005 | RE/CE | 2009/02/03 * 12 |
| MOS-15 | Thermo-Hygrometer | Custom | CTH-180 | - | RE/CE | 2009/02/06 * 12 |
| MJM-07 | Measure | PROMART | SEN1955 | - | RE/CE | - |
| MSA-10 | Spectrum Analyzer | Agilent | E4448A | MY46180655 | RE | 2009/02/25 * 12 |
| MCC-57 | Microwave Cable 1G-26.5GHz 6m | Suhner | SUCOFLEX104 | 246769(1m) / 292411(5m) | RE | 2008/11/05 * 12 |
| MPA-12 | MicroWave System Amplifier | Agilent | 83017A | MY39500780 | RE | 2009/03/19 * 12 |
| MHA-17 | Horn Antenna 15-40GHz | Schwarzbeck | BBHA9170 | BBHA9170307 | RE | 2009/04/30 * 12 |
| MSA-05 | Spectrum Analyzer | Advantest | R3273 | 160400285 | RE/CE | 2008/06/25 * 12 |
| MTR-07 | Test Receiver | Rohde & Schwarz | ESCI | 100635 | RE/CE | 2008/10/03 * 12 |
| MBA-05 | Biconical Antenna | Schwarzbeck | BBA9106 | 1302 | RE | 2009/01/10 * 12 |
| MLA-08 | Logperiodic Antenna | Schwarzbeck | UKLP9140-A | N/A | RE | 2009/01/10 * 12 |
| MCC-50 | Coaxial cable | UL Japan | - | - | RE | 2009/03/18 * 12 |
| MAT-07 | Attenuator(6dB) | Weinschel Corp | 2 | BK7970 | RE | 2008/11/14 * 12 |
| MPA-14 | Pre Amplifier | SONOMA INSTRUMENT | 310 | 260833 | RE | 2009/03/18 * 12 |
| MLS-06 | LISN(AMN) | Schwarzbeck | NSLK8127 | 8127363 | CE(EUT) | 2009/02/18 * 12 |
| MLS-07 | LISN(AMN) | Schwarzbeck | NSLK8127 | 8127364 | CE(AE) | 2009/02/18 * 12 |
| MTA-07 | Terminator | MCL | BTRM-50 | 1 9944 | CE | 2009/02/17 * 12 |
| MCC-113 | Coaxial cable | Fujikura/Suhner/TSJ | - | - | CE | 2008/07/03 * 12 |
| MOS-24 | Thermo-Hygrometer | Custom | CTH-201 | 0005 | AT | 2009/02/04 * 12 |
| MSA-10 | Spectrum Analyzer | Agilent | E4448A | MY46180655 | AT | 2009/02/25 * 12 |
| MPM-13 | Power Meter | Anritsu | ML2495A | 0824014 | AT | 2008/08/13 * 12 |
| MPSE-18 | Power sensor | Anritsu | MA2411B | 0738174 | AT | 2008/08/13 * 12 |
| MAT-23 | Attenuator(10dB) DC-18GHz | Orient Microwave | BX10-0476-00 | - | AT | 2009/03/24 * 12 |
| MCC-66 | Microwave Cable 1G-40GHz | Schner | SUCOFLEX102 | 28636/2 | AT | 2009/04/21 * 12 |
| MCC-35 | Microwave Cable | Hirose Electric | U.FL-2LP-066-A-(200) | - | AT | 2008/11/18 * 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:** **CE: Conducted Emission**
**RE: Radiated Emission**
**AT: Antenna Terminal Conducted test**

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