# Co-location Report

# 1 TEST RESULT

## 1.1 Radiated Emissions Measurement

### 1.1.1 Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(kHz) | 300 |
| 0.490~1.705 | 24000/F(kHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

### 1.1.2 Measuring Instruments and Setting

Please refer to section 2 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start Frequency | 1000 MHz |
| Stop Frequency | 10th carrier harmonic |
| RB / VB (Emission in restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |
| RB / VB (Emission in non-restricted band) | 1MHz / 1MHz for peak |

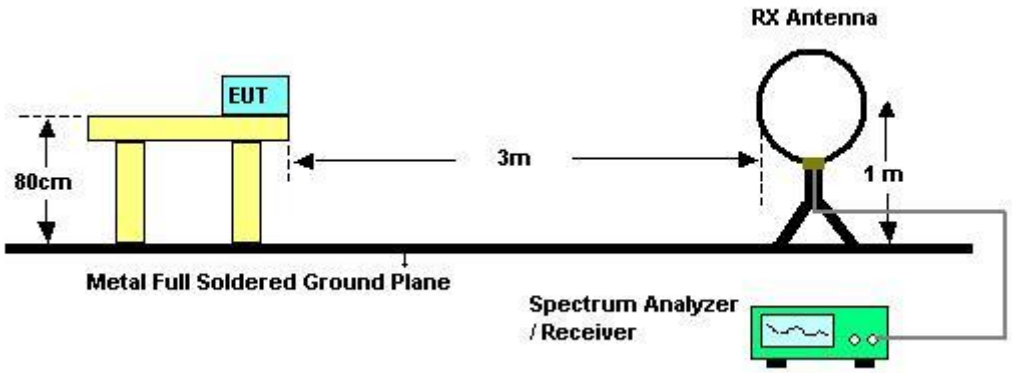
| Receiver Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~150kHz / RB 200Hz for QP |
| Start ~ Stop Frequency | 150kHz~30MHz / RB 9kHz for QP |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |

### 1.1.3 Test Procedures

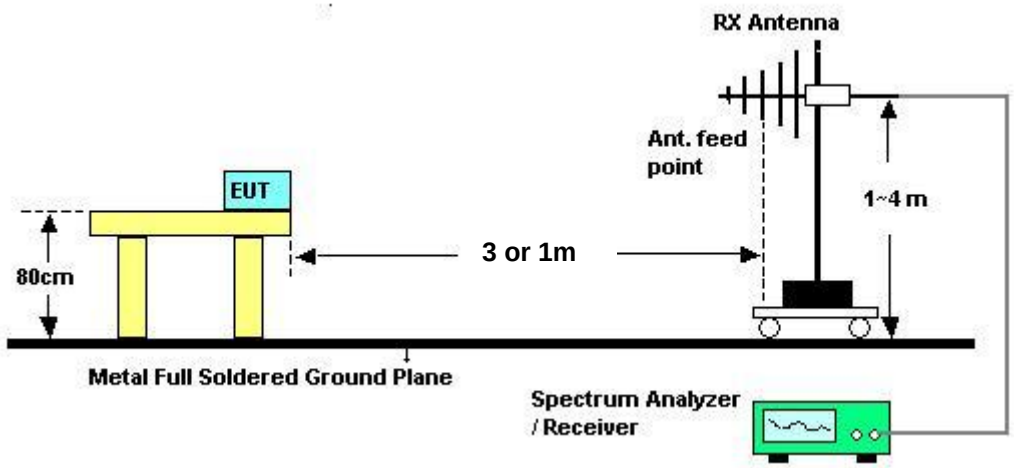
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

### 1.1.4 Test Setup Layout

**For radiated emissions below 30MHz**




**For radiated emissions above 30MHz**




Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.
Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

### 1.1.5 Test Deviation

There is no deviation with the original standard.

### 1.1.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

### 1.1.7 Results of Radiated Emissions (9kHz~30MHz)

| **Final Test Date** | May 11, 2012 | **Test Site No.** | 03CH02-HY |
|---|---|---|---|
| **Temperature** | 25.1℃ | **Humidity** | 56% |
| **Test Engineer** | Streak | | |

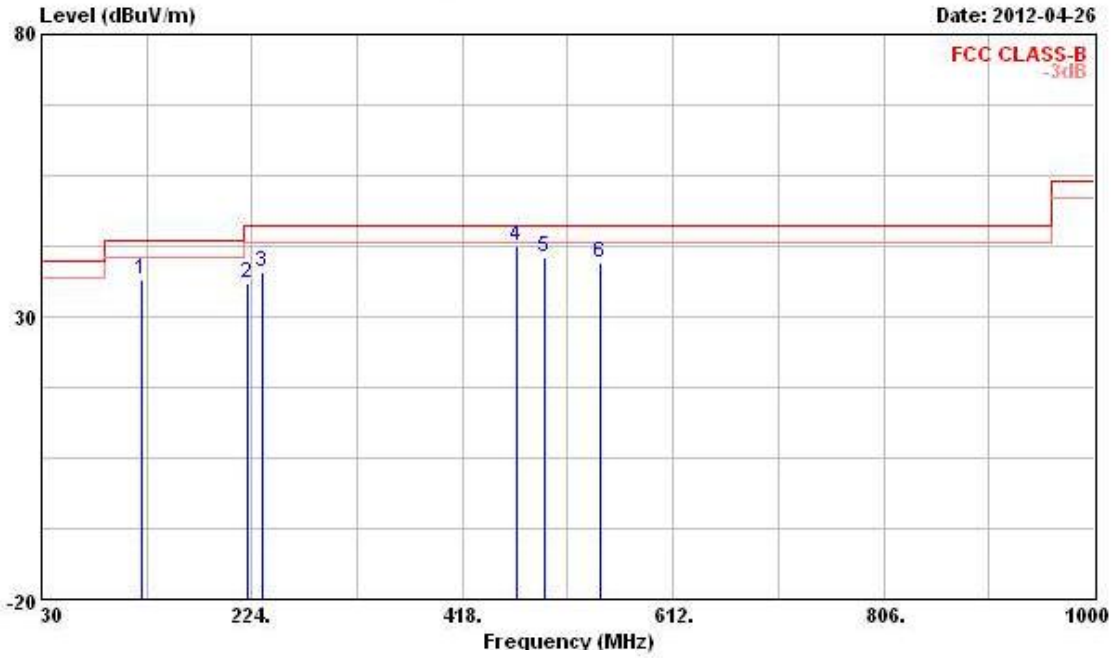
| **Freq. (MHz)** | **Level (dBuV)** | **Over Limit (dB)** | **Limit Line (dBuV)** | **Remark** |
|---|---|---|---|---|
| - | - | - | - | See Note |

Note:
The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.

### 1.1.8 Results of Radiated Emissions (30MHz~1GHz)

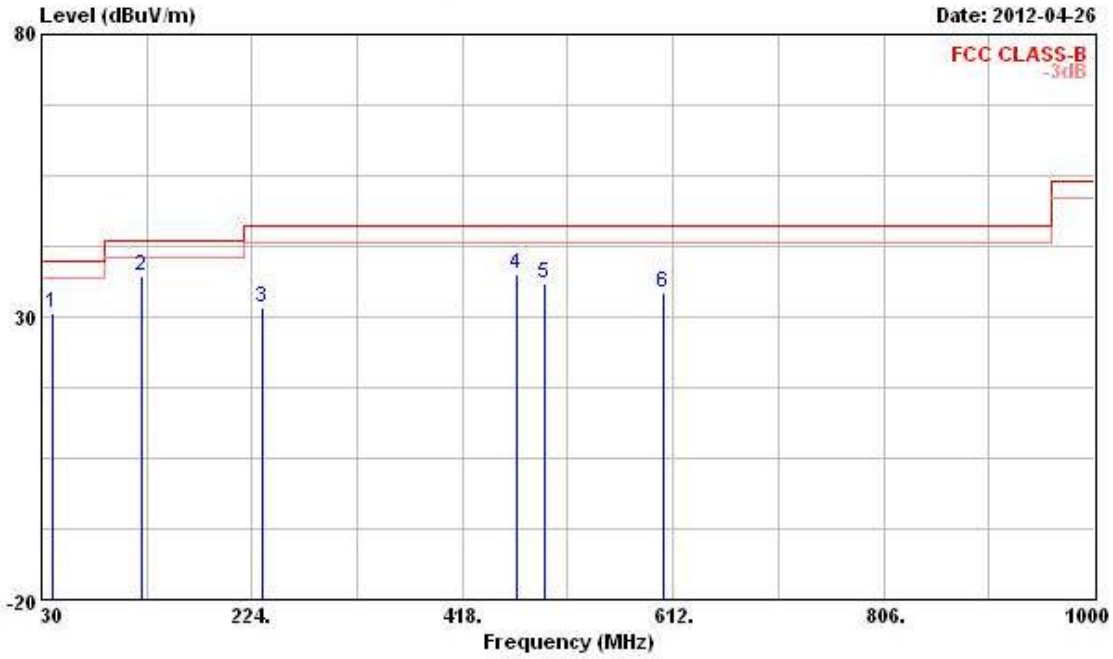
| | | | |
|---|---|---|---|
| **Final Test Date** | Apr. 26, 2012 | **Test Site No.** | 03CH02-HY |
| **Temperature** | 25.1℃ | **Humidity** | 56% |
| **Test Engineer** | Streak | **Configuration** | TX 2437MHz 11b + Bluetooth TX 2402MHz + TX 13.56MHz (Adapter Mode ) |

***Horizontal***




| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 122.150 | 36.55 | -6.95 | 43.50 | 49.12 | 13.34 | 1.84 | 27.75 | Peak | --- | --- |
| 2 | 219.150 | 35.84 | -10.16 | 46.00 | 48.66 | 11.98 | 2.56 | 27.36 | Peak | --- | --- |
| 3 | 233.700 | 37.96 | -8.04 | 46.00 | 50.16 | 12.46 | 2.67 | 27.33 | Peak | --- | --- |
| 4 | 467.470 | 42.62 | -3.38 | 46.00 | 50.54 | 16.63 | 3.66 | 28.21 | Peak | --- | --- |
| 5 | 493.660 | 40.44 | -5.56 | 46.00 | 47.82 | 17.16 | 3.80 | 28.34 | Peak | --- | --- |
| 6 | 545.070 | 39.70 | -6.30 | 46.00 | 45.51 | 18.58 | 4.02 | 28.41 | Peak | --- | --- |

***Vertical***

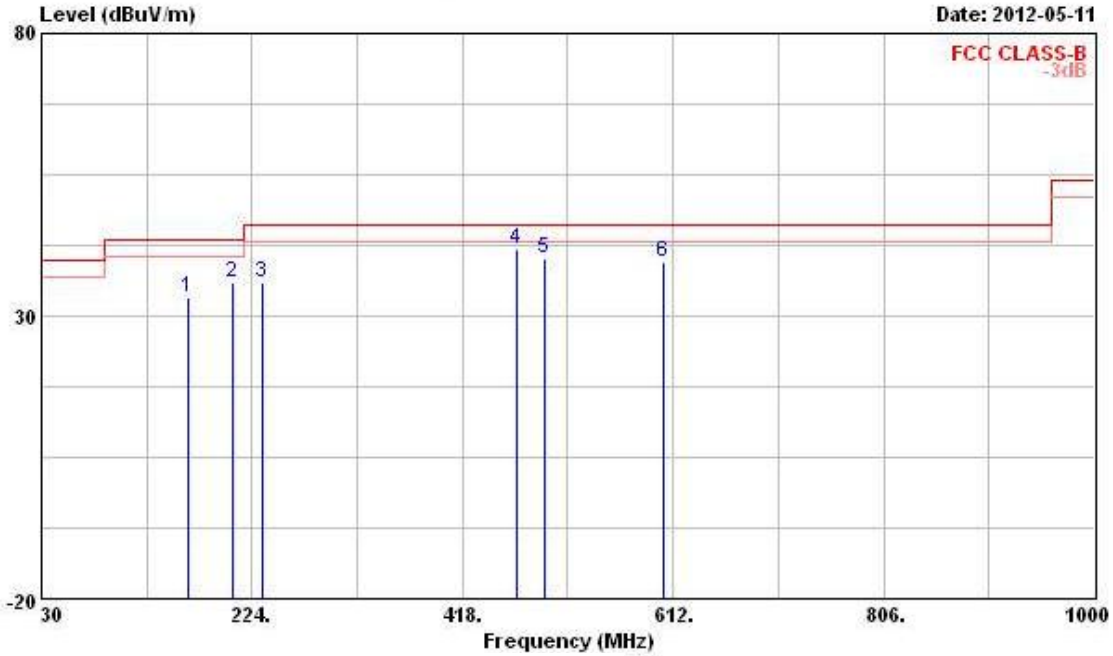



| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 40.670 | 30.81 | -9.19 | 40.00 | 44.65 | 13.01 | 1.05 | 27.90 | Peak | --- | --- |
| 2 | 122.150 | 37.24 | -6.26 | 43.50 | 49.81 | 13.34 | 1.84 | 27.75 | Peak | --- | --- |
| 3 | 233.700 | 31.63 | -14.37 | 46.00 | 43.83 | 12.46 | 2.67 | 27.33 | Peak | --- | --- |
| 4 | 467.470 | 37.67 | -8.33 | 46.00 | 45.59 | 16.63 | 3.66 | 28.21 | Peak | --- | --- |
| 5 | 493.660 | 36.00 | -10.00 | 46.00 | 43.38 | 17.16 | 3.80 | 28.34 | Peak | --- | --- |
| 6 | 603.270 | 34.24 | -11.76 | 46.00 | 38.30 | 20.14 | 4.25 | 28.45 | Peak | --- | --- |

Note:
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

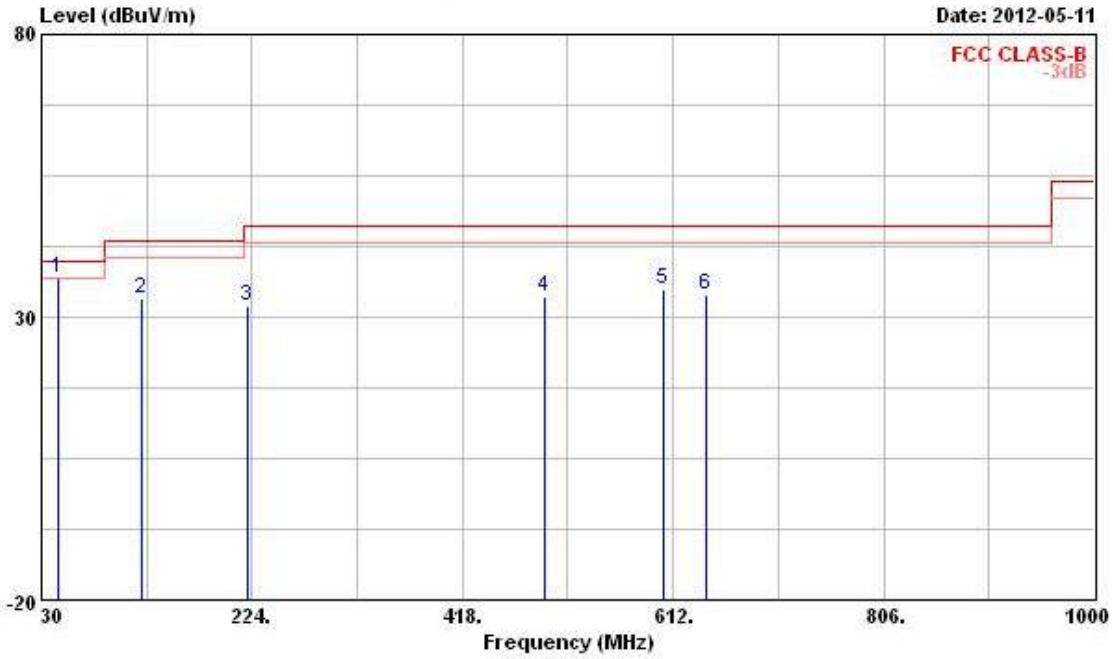
| **Final Test Date** | May 11, 2012 | **Test Site No.** | 03CH02-HY |
|---|---|---|---|
| **Temperature** | 25.1℃ | **Humidity** | 56% |
| **Test Engineer** | Streak | **Configuration** | TX 2437MHz 11b + Bluetooth TX 2402MHz + TX 13.56MHz (USB Mode ) |

***Horizontal***




| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 164.830 | 33.35 | -10.15 | 43.50 | 48.43 | 10.34 | 2.14 | 27.56 | Peak | --- | --- |
| 2 | 206.540 | 35.85 | -7.65 | 43.50 | 49.20 | 11.57 | 2.47 | 27.39 | Peak | --- | --- |
| 3 | 233.700 | 35.77 | -10.23 | 46.00 | 47.97 | 12.46 | 2.67 | 27.33 | Peak | --- | --- |
| 4 | 467.470 | 41.75 | -4.25 | 46.00 | 49.67 | 16.63 | 3.66 | 28.21 | Peak | --- | --- |
| 5 | 493.660 | 40.13 | -5.87 | 46.00 | 47.51 | 17.16 | 3.80 | 28.34 | Peak | --- | --- |
| 6 | 603.270 | 39.53 | -6.47 | 46.00 | 43.59 | 20.14 | 4.25 | 28.45 | Peak | --- | --- |

***Vertical***



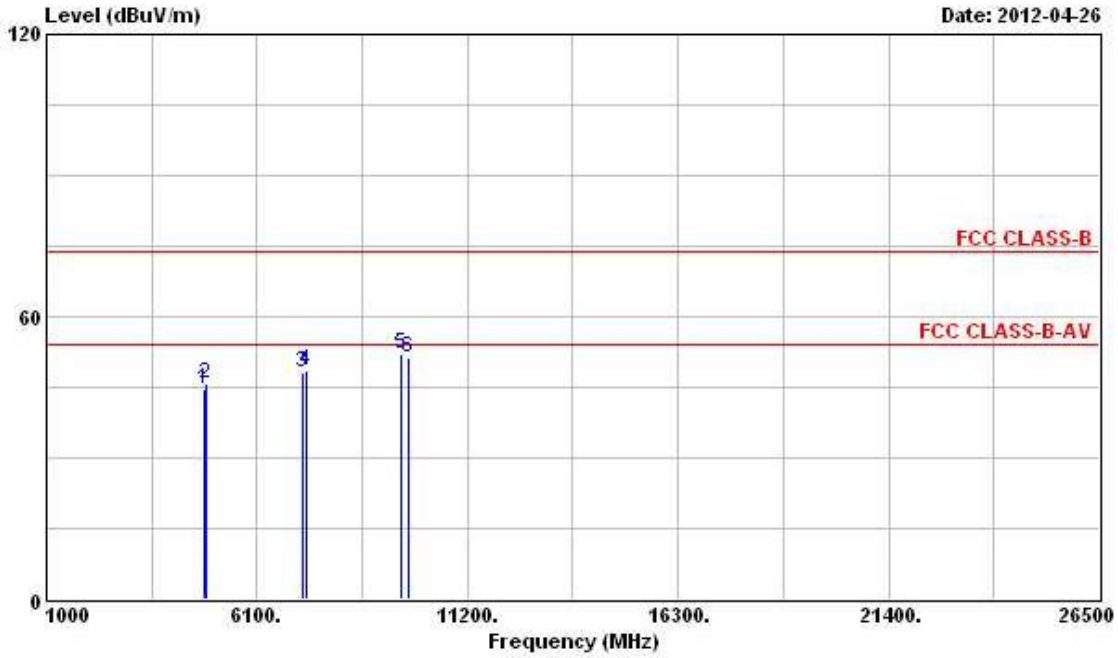

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 @ | 44.550 | 36.75 | -3.25 | 40.00 | 51.51 | 12.02 | 1.10 | 27.88 | Peak | --- | --- |
| 2 | 122.150 | 33.41 | -10.09 | 43.50 | 45.98 | 13.34 | 1.84 | 27.75 | Peak | --- | --- |
| 3 | 219.150 | 31.97 | -14.03 | 46.00 | 44.79 | 11.98 | 2.56 | 27.36 | Peak | --- | --- |
| 4 | 493.660 | 33.73 | -12.27 | 46.00 | 41.11 | 17.16 | 3.80 | 28.34 | Peak | --- | --- |
| 5 | 603.270 | 35.07 | -10.93 | 46.00 | 39.13 | 20.14 | 4.25 | 28.45 | Peak | --- | --- |
| 6 | 642.070 | 33.86 | -12.14 | 46.00 | 38.25 | 19.62 | 4.37 | 28.38 | Peak | --- | --- |

Note:
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

### 1.1.9 Results for Radiated Emissions (1GHz~10th Harmonic)

| | | | |
|---|---|---|---|
| **Final Test Date** | Apr. 26, 2012 | **Test Site No.** | 03CH02-HY |
| **Temperature** | 25.1℃ | **Humidity** | 56% |
| **Test Engineer** | Streak | **Configuration** | TX 2437MHz 11b + Bluetooth TX 2402MHz + TX 13.56MHz (Adapter Mode ) |

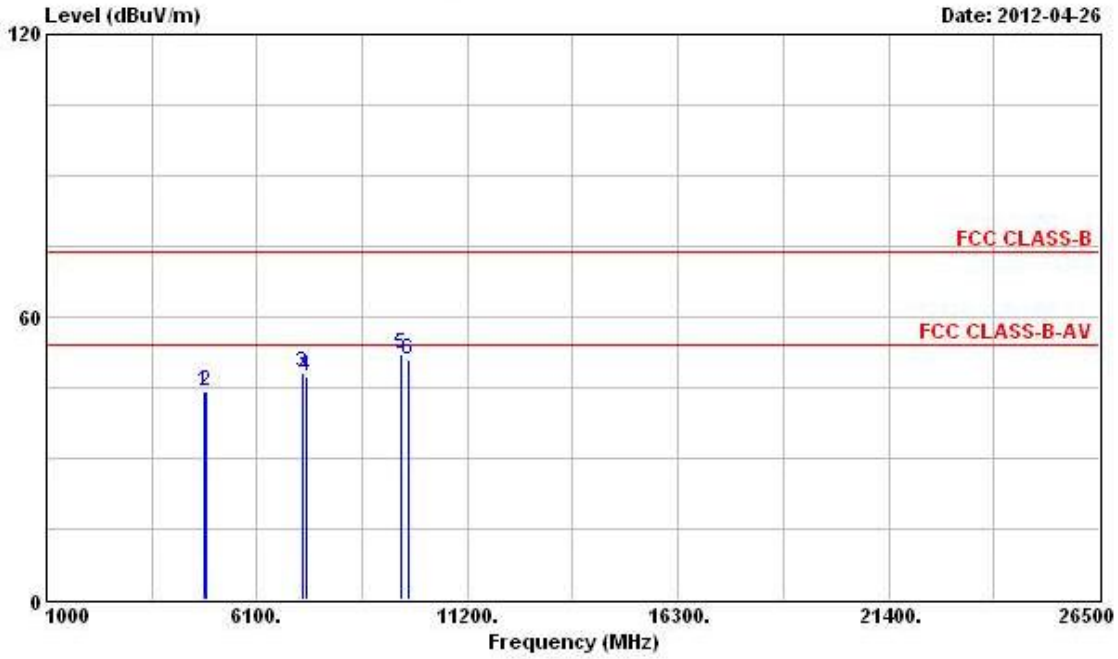
***Horizontal***




| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 4804.000 | 44.80 | -9.20 | 54.00 | 39.29 | 35.73 | 4.58 | 34.80 | PK | --- | --- |
| 2 | 4874.000 | 45.66 | -8.34 | 54.00 | 40.00 | 35.83 | 4.61 | 34.78 | PK | --- | --- |
| 3 | 7206.000 | 48.12 | | | 39.73 | 37.84 | 5.62 | 35.07 | Peak | --- | --- |
| 4 | 7311.000 | 48.51 | -5.49 | 54.00 | 40.11 | 37.86 | 5.64 | 35.10 | PK | --- | --- |
| 5 | 9608.000 | 52.03 | | | 41.84 | 39.32 | 6.34 | 35.47 | Peak | --- | --- |
| 6 | 9748.000 | 51.25 | | | 40.86 | 39.51 | 6.36 | 35.48 | Peak | --- | --- |

Note: The Items 3, 5 and 6 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.

***Vertical***




| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 4804.000 | 44.24 | -9.76 | 54.00 | 39.35 | 35.11 | 4.58 | 34.80 | PK | --- | --- |
| 2 | 4874.000 | 44.09 | -9.91 | 54.00 | 39.08 | 35.18 | 4.61 | 34.78 | PK | --- | --- |
| 3 | 7206.000 | 48.13 | | | 40.70 | 36.88 | 5.62 | 35.07 | Peak | --- | --- |
| 4 | 7311.000 | 47.23 | -6.77 | 54.00 | 39.77 | 36.92 | 5.64 | 35.10 | PK | --- | --- |
| 5 | 9608.000 | 52.25 | | | 42.86 | 38.52 | 6.34 | 35.47 | Peak | --- | --- |
| 6 | 9748.000 | 50.87 | | | 41.28 | 38.71 | 6.36 | 35.48 | Peak | --- | --- |

Note: The Items 3, 5 and 6 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.

# 2 LIST OF MEASURING EQUIPMENTS

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|---|---|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSP40 | 100593 | 9 kHz ~ 40 GHz | Sep. 01, 2011 | Radiation (03CH02-HY) |
| 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH02-HY | 30 MHz ~ 1 GHz 3m | May 11, 2011 | Radiation (03CH02-HY) |
| Amplifier | Agilent | 8447D | 2944A11146 | 100 kHz ~ 1.3 GHz | Jul. 25, 2011 | Radiation (03CH02-HY) |
| Amplifier | Agilent | 8449B | 3008A02373 | 1 GHz ~ 26.5 GHz | Jul. 25, 2011 | Radiation (03CH02-HY) |
| Horn Antenna | ETS-LINDGREN | 3117 | 00091920 | 1 GHz ~ 18 GHz | Nov. 15, 2011 | Radiation (03CH02-HY) |
| RF Cable-R03m | Jye Bao | RG142 | CB021 | 30 MHz ~ 1 GHz | Nov. 11, 2011 | Radiation (03CH02-HY) |
| RF Cable-high | SUHNER | SUCOFLEX106 | 03CH02-HY | 1 GHz ~ 40 GHz | Mar. 06, 2012 | Radiation (03CH02-HY) |
| Bilog Antenna | SCHAFFNER | CBL61128 | 2723 | 30 MHz ~ 2 GHz | Oct. 22, 2011 | Radiation (03CH02-HY) |
| Turn Table | HD | DS 420 | 420/649/00 | 0 - 360 degree | N/A | Radiation (03CH02-HY) |
| Antenna Mast | HD | MA 240 | 240/559/00 | 1 m - 4 m | N/A | Radiation (03CH02-HY) |

Note: Calibration Interval of instruments listed above is one year.

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|---|---|---|---|---|---|---|
| Loop Antenna | R&S | HFH2-Z2 | 860004/001 | 9 kHz - 30 MHz | Jul. 29, 2010* | Radiation (03CH02-HY) |
| Amplifier | MITEQ | AMF-6F-260400 | 9121372 | 26.5GHz ~ 40GHz | Apr. 19, 2011* | Radiation (03CH02-HY) |

Note: Calibration Interval of instruments listed above is two year.

# 3 TEST LOCATION

| | | | |
|---|---|---|---|
| SHIJR | ADD | : | 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei 221, Taiwan, R.O.C. |
| | TEL | : | 886-2-2696-2468 |
| | FAX | : | 886-2-2696-2255 |
| HWA YA | ADD | : | No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. |
| | TEL | : | 886-3-327-3456 |
| | FAX | : | 886-3-318-0055 |
| LINKOU | ADD | : | No. 30-2, Dingfu Vil., Linkou Dist., New Taipei City 244,, Taiwan, R.O.C. |
| | TEL | : | 886-2-2601-1640 |
| | FAX | : | 886-2-2601-1695 |
| DUNGHU | ADD | : | No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei 114, Taiwan, R.O.C. |
| | TEL | : | 886-2-2631-4739 |
| | FAX | : | 886-2-2631-9740 |
| JUNGHE | ADD | : | 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei 235, Taiwan, R.O.C. |
| | TEL | : | 886-2-8227-2020 |
| | FAX | : | 886-2-8227-2626 |
| NEIHU | ADD | : | 4Fl., No. 339, Hsin Hu 2nd Rd., Taipei 114, Taiwan, R.O.C. |
| | TEL | : | 886-2-2794-8886 |
| | FAX | : | 886-2-2794-9777 |
| JHUBEI | ADD | : | No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. |
| | TEL | : | 886-3-656-9065 |
| | FAX | : | 886-3-656-9085 |