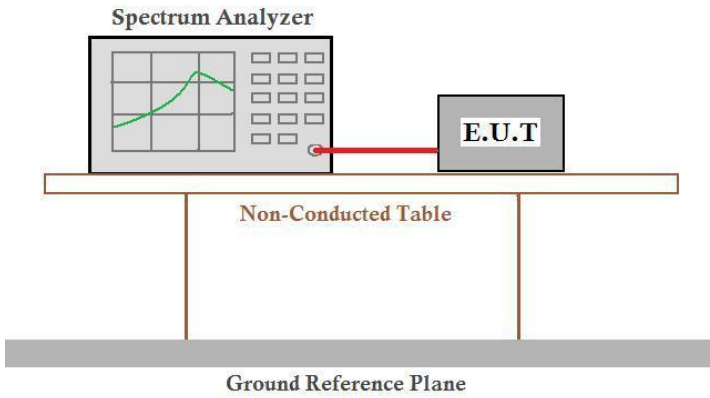


## 6.6. Spurious Emission

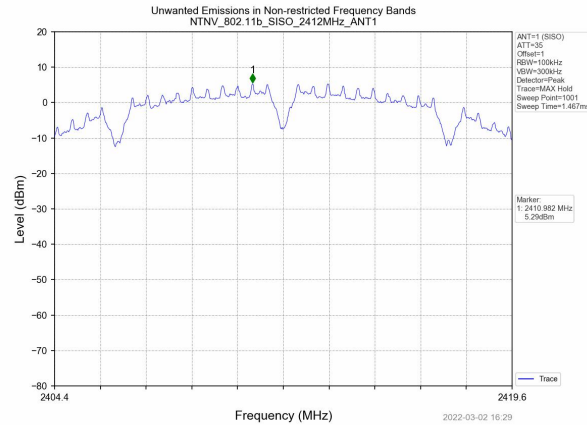
### 6.6.1. Conducted Emission Method

|                   |                                                                                                                                                                                                                                                                                                                                                                                         |       |         |     |         |          |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------|-----|---------|----------|
| Test Requirement: | FCC Part15 C Section 15.247 (d)                                                                                                                                                                                                                                                                                                                                                         |       |         |     |         |          |
| Test Method:      | KDB558074 D01 15.247 Meas Guidance v05r02                                                                                                                                                                                                                                                                                                                                               |       |         |     |         |          |
| Limit:            | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. |       |         |     |         |          |
| Test setup:       |  <p>The diagram illustrates the test setup for conducted emission measurement. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>                                   |       |         |     |         |          |
| Test Instruments: | Refer to section 6.0 for details                                                                                                                                                                                                                                                                                                                                                        |       |         |     |         |          |
| Test mode:        | Refer to section 5.2 for details                                                                                                                                                                                                                                                                                                                                                        |       |         |     |         |          |
| Test results:     | Pass                                                                                                                                                                                                                                                                                                                                                                                    |       |         |     |         |          |
| Test environment: | Temp.:                                                                                                                                                                                                                                                                                                                                                                                  | 25 °C | Humid.: | 52% | Press.: | 1012mbar |

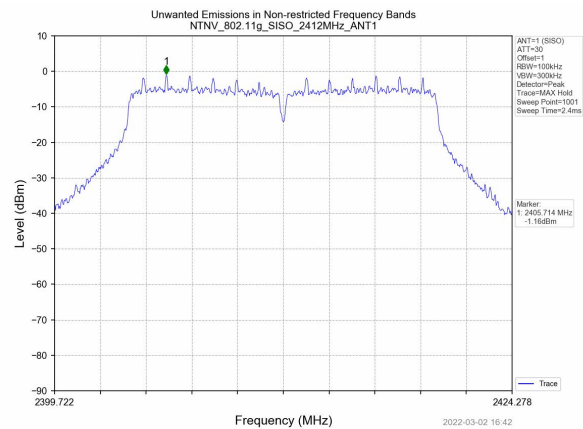


## Measurement Data:

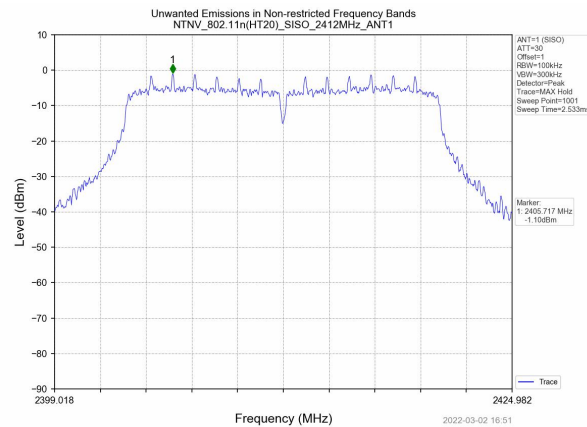
## Reference



## 802.11b



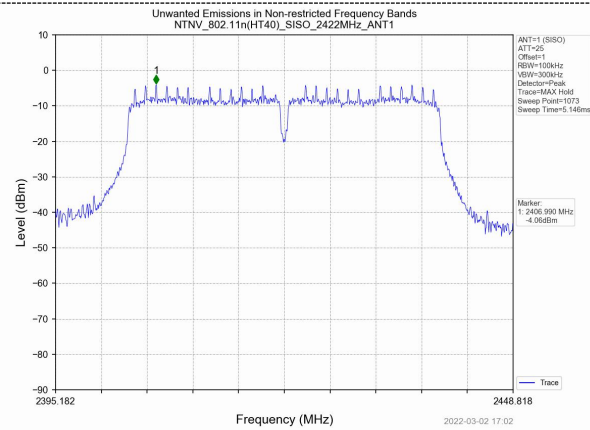
## 802.11g



## 802.11n(HT20)



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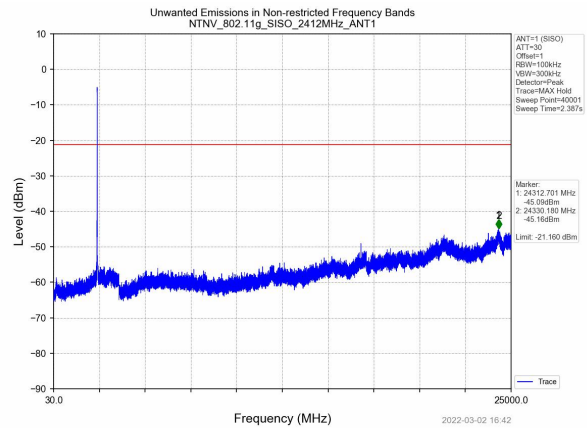
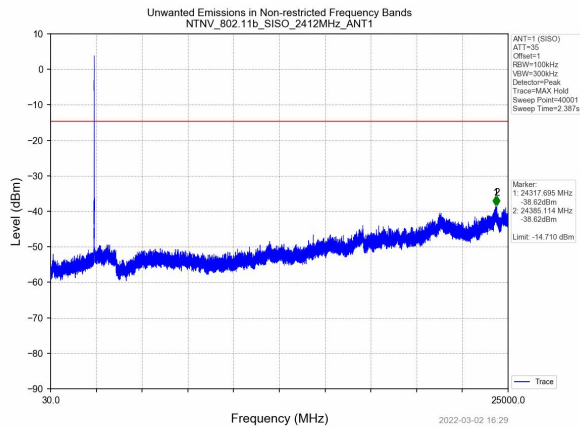
**802.11n(HT40)**



802.11b

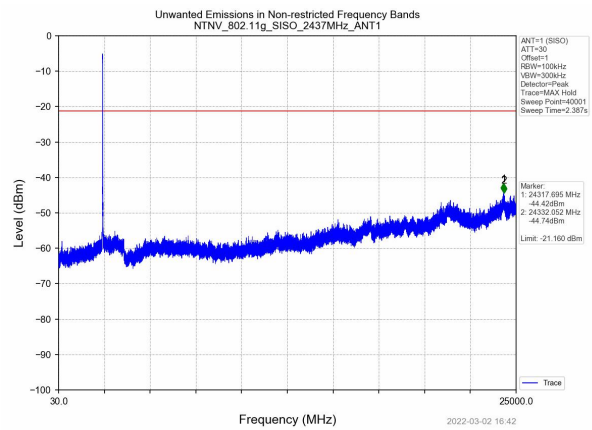
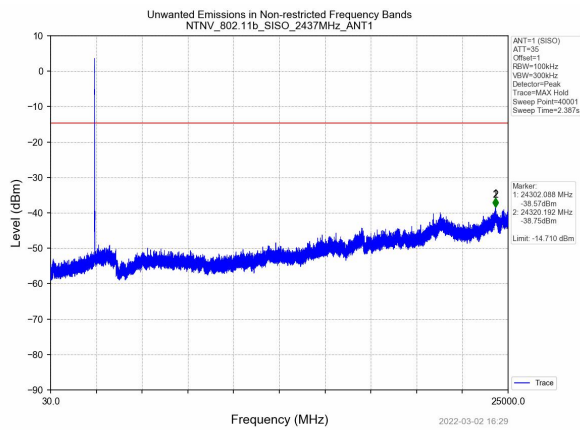
802.11g

## Lowest channel



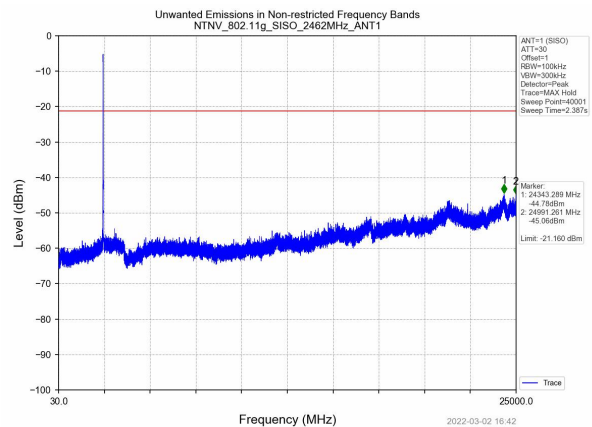
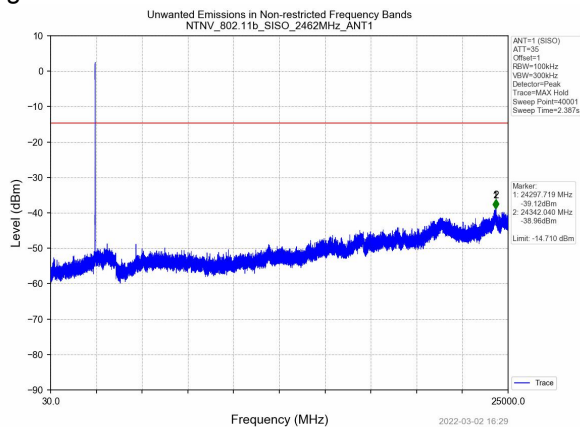
30MHz~25GHz

## Middle channel



30MHz~25GHz

## Highest channel



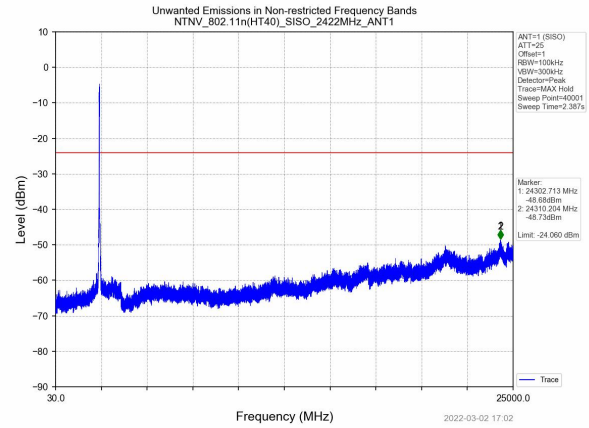
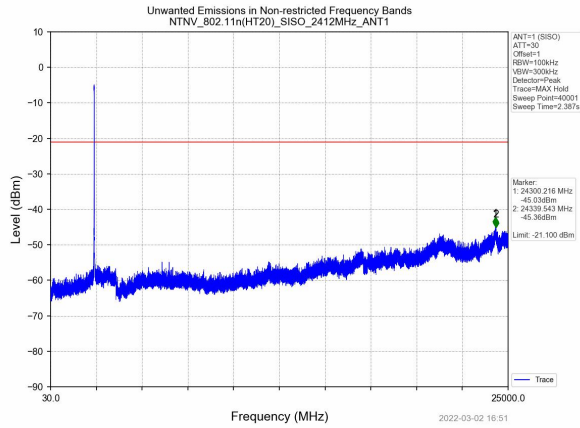
30MHz~25GHz



## 802.11n(HT20)

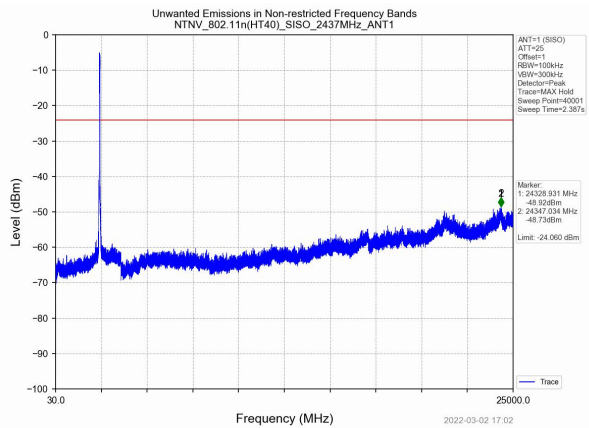
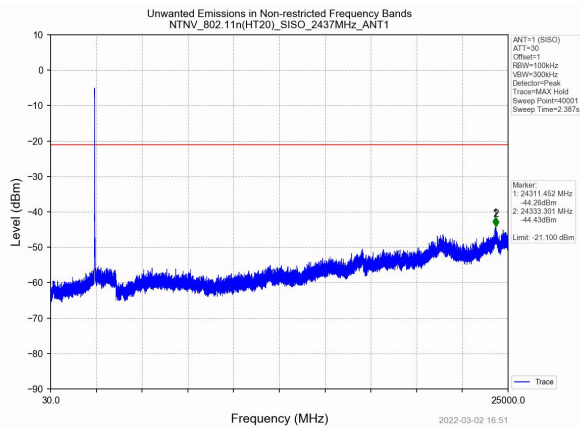
## 802.11n(HT40)

## Lowest channel



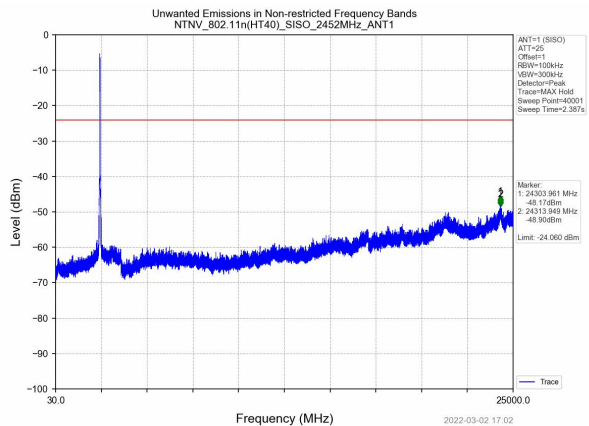
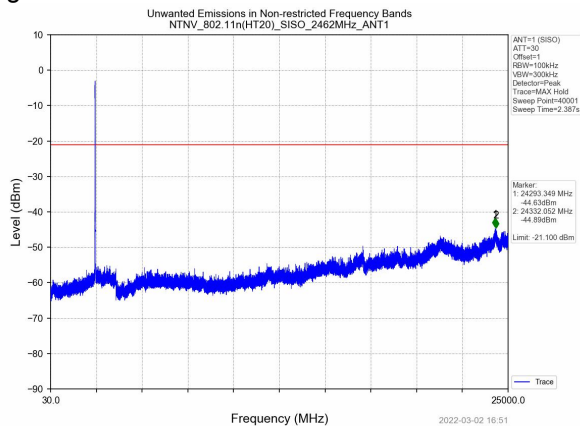
30MHz~25GHz

## Middle channel



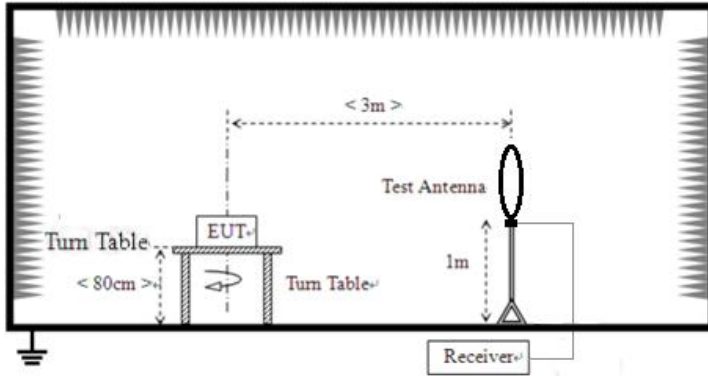
30MHz~25GHz

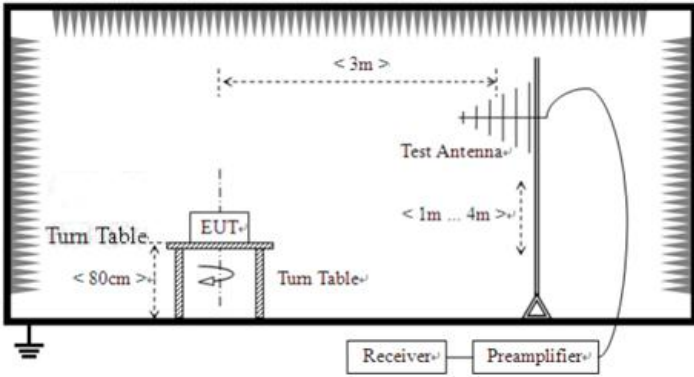
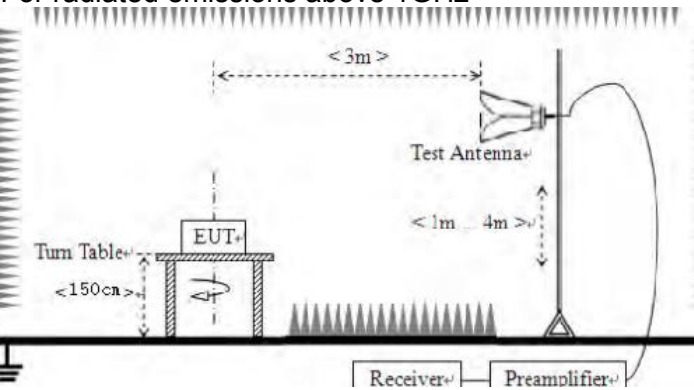
## Highest channel



30MHz~25GHz

### 6.6.2. Radiated Emission Method

|                       |                                                                                      |              |         |                      |            |
|-----------------------|--------------------------------------------------------------------------------------|--------------|---------|----------------------|------------|
| Test Requirement:     | FCC Part15 C Section 15.209                                                          |              |         |                      |            |
| Test Method:          | ANSI C63.10:2013                                                                     |              |         |                      |            |
| Test Frequency Range: | 9kHz to 25GHz                                                                        |              |         |                      |            |
| Test site:            | Measurement Distance: 3m                                                             |              |         |                      |            |
| Receiver setup:       | Frequency                                                                            | Detector     | RBW     | VBW                  | Value      |
|                       | 9KHz-150KHz                                                                          | Quasi-peak   | 200Hz   | 600Hz                | Quasi-peak |
|                       | 150KHz-30MHz                                                                         | Quasi-peak   | 9KHz    | 30KHz                | Quasi-peak |
|                       | 30MHz-1GHz                                                                           | Quasi-peak   | 120KHz  | 300KHz               | Quasi-peak |
|                       | Above 1GHz                                                                           | Peak         | 1MHz    | 3MHz                 | Peak       |
|                       |                                                                                      | Peak         | 1MHz    | 10Hz                 | Average    |
| Limit:                | Frequency                                                                            | Limit (uV/m) | Value   | Measurement Distance |            |
|                       | 0.009MHz-0.490MHz                                                                    | 2400/F(KHz)  | QP      | 300m                 |            |
|                       | 0.490MHz-1.705MHz                                                                    | 24000/F(KHz) | QP      | 30m                  |            |
|                       | 1.705MHz-30MHz                                                                       | 30           | QP      | 30m                  |            |
|                       | 30MHz-88MHz                                                                          | 100          | QP      | 3m                   |            |
|                       | 88MHz-216MHz                                                                         | 150          | QP      |                      |            |
|                       | 216MHz-960MHz                                                                        | 200          | QP      |                      |            |
|                       | 960MHz-1GHz                                                                          | 500          | QP      |                      |            |
|                       | Above 1GHz                                                                           | 500          | Average |                      |            |
|                       |                                                                                      | 5000         | Peak    |                      |            |
| Test setup:           | For radiated emissions from 9kHz to 30MHz                                            |              |         |                      |            |
|                       |  |              |         |                      |            |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          | <p>For radiated emissions from 30MHz to 1GHz</p>  <p>For radiated emissions above 1GHz</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p>Test Procedure:</p>   | <ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> </ol> |
| <p>Test Instruments:</p> | <p>Refer to section 6.0 for details</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <p>Test mode:</p>        | <p>Refer to section 5.2 for details</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



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|                   |               |       |         |     |         |          |
|-------------------|---------------|-------|---------|-----|---------|----------|
| Test environment: | Temp.:        | 25 °C | Humid.: | 52% | Press.: | 1012mbar |
| Test voltage:     | AC 120V, 60Hz |       |         |     |         |          |
| Test results:     | Pass          |       |         |     |         |          |

*Remarks:*

- 1.Only the worst case Main Antenna test data.*
- 2.Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.*

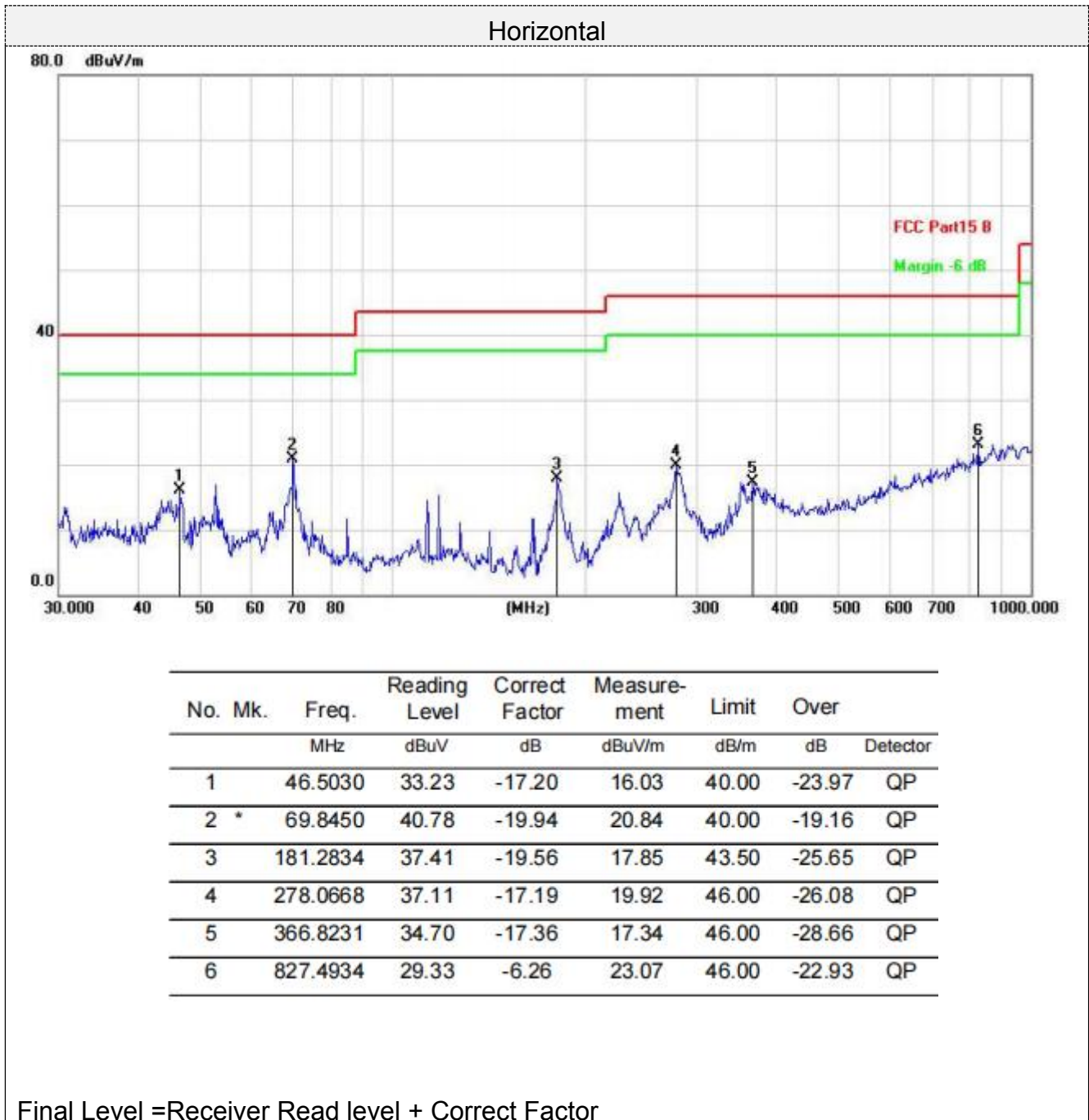
**Measurement data:**

■ **9kHz~30MHz**

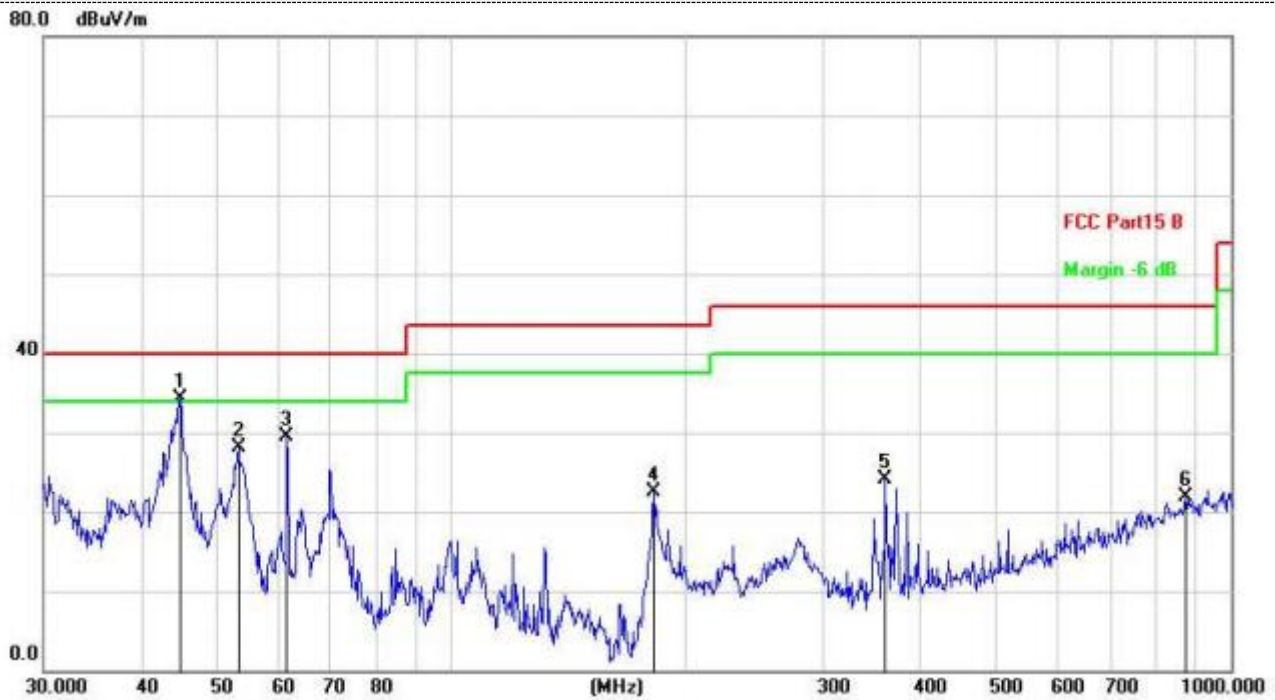
The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

## ■ Below 1GHz

Pre-scan all test modes, found worst case at 802.11b 2437MHz, and so only show the test result of 802.11b 2437MHz



### Vertical



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dB/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|---------------|------------|----------|
| 1   | *   | 44.9006      | 51.65                    | -17.42                  | 34.23                      | 40.00         | -5.77      | QP       |
| 2   |     | 53.3179      | 45.56                    | -17.50                  | 28.06                      | 40.00         | -11.94     | QP       |
| 3   |     | 61.5618      | 47.84                    | -18.42                  | 29.42                      | 40.00         | -10.58     | QP       |
| 4   |     | 181.9202     | 42.27                    | -19.78                  | 22.49                      | 43.50         | -21.01     | QP       |
| 5   |     | 360.4476     | 41.01                    | -16.92                  | 24.09                      | 46.00         | -21.91     | QP       |
| 6   |     | 875.2470     | 27.25                    | -5.36                   | 21.89                      | 46.00         | -24.11     | QP       |

Final Level =Receiver Read level + Correct Factor



## ■ Above 1GHz

*Note: During the test, pre-scan the 802.11b/802.11g/802.11n (H20)/802.11n (H40) modulation, and found the 802.11b modulation which it is worse case.*

## 802.11b:Lowest

## Horizontal:

| Frequency | Meter Reading | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limits   | Margin | Detector Type |
|-----------|---------------|----------------|------------|---------------|----------------|----------|--------|---------------|
| (MHz)     | (dBμV)        | (dB/m)         | (dB)       | (dB)          | (dBμV/m)       | (dBμV/m) | (dB)   |               |
| 4824      | 52.44         | 31.40          | 8.18       | 31.50         | 60.52          | 74.00    | -13.48 | peak          |
| 4824      | 38.21         | 31.40          | 8.18       | 31.50         | 46.29          | 54.00    | -7.71  | AVG           |
| 7236      | 45.26         | 35.80          | 10.83      | 31.40         | 60.49          | 74.00    | -13.51 | peak          |
| 7236      | 28.51         | 35.80          | 10.83      | 31.40         | 43.74          | 54.00    | -10.26 | AVG           |
| ---       | ---           |                |            | ---           | ---            | ---      | ---    | ---           |
| ---       | ---           |                |            | ---           | ---            | ---      | ---    | ---           |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

## Vertical:

| Frequency | Meter Reading | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limits   | Margin | Detector Type |
|-----------|---------------|----------------|------------|---------------|----------------|----------|--------|---------------|
| (MHz)     | (dBμV)        | (dB/m)         | (dB)       | (dB)          | (dBμV/m)       | (dBμV/m) | (dB)   |               |
| 4824      | 51.66         | 31.40          | 8.18       | 31.50         | 59.74          | 74.00    | -14.26 | peak          |
| 4824      | 37.20         | 31.40          | 8.18       | 31.50         | 45.28          | 54.00    | -8.72  | AVG           |
| 7236      | 45.33         | 35.80          | 10.83      | 31.40         | 60.56          | 74.00    | -13.44 | peak          |
| 7236      | 28.78         | 35.80          | 10.83      | 31.40         | 44.01          | 54.00    | -9.99  | AVG           |
| ---       | ---           |                |            | ---           | ---            | ---      | ---    | ---           |
| ---       | ---           |                |            | ---           | ---            | ---      | ---    | ---           |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



## 802.11b:Middle

## Horizontal:

| Frequency | Meter Reading | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limits   | Margin | Detector Type |
|-----------|---------------|----------------|------------|---------------|----------------|----------|--------|---------------|
| (MHz)     | (dBμV)        | (dB/m)         | (dB)       | (dB)          | (dBμV/m)       | (dBμV/m) | (dB)   |               |
| 4874      | 52.30         | 31.40          | 9.17       | 32.10         | 60.77          | 74.00    | -13.23 | peak          |
| 4874      | 37.15         | 31.40          | 9.17       | 32.10         | 45.62          | 54.00    | -8.38  | AVG           |
| 7311      | 41.66         | 35.80          | 10.83      | 31.40         | 56.89          | 74.00    | -17.11 | peak          |
| 7311      | 28.66         | 35.80          | 10.83      | 31.40         | 43.89          | 54.00    | -10.11 | AVG           |
| ---       | ---           |                |            | ---           | ---            | ---      | ---    | ---           |
| ---       | ---           |                |            | ---           | ---            | ---      | ---    | ---           |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

## Vertical:

| Frequency | Meter Reading | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limits   | Margin | Detector Type |
|-----------|---------------|----------------|------------|---------------|----------------|----------|--------|---------------|
| (MHz)     | (dBμV)        | (dB/m)         | (dB)       | (dB)          | (dBμV/m)       | (dBμV/m) | (dB)   |               |
| 4874      | 52.30         | 31.40          | 9.17       | 32.10         | 60.77          | 74.00    | -13.23 | peak          |
| 4874      | 38.11         | 31.40          | 9.17       | 32.10         | 46.58          | 54.00    | -7.42  | AVG           |
| 7311      | 43.85         | 35.80          | 10.83      | 31.40         | 59.08          | 74.00    | -14.92 | peak          |
| 7311      | 27.99         | 35.80          | 10.83      | 31.40         | 43.22          | 54.00    | -10.78 | AVG           |
| ---       | ---           |                |            | ---           | ---            | ---      | ---    | ---           |
| ---       | ---           |                |            | ---           | ---            | ---      | ---    | ---           |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



## 802.11b: Highest

## Horizontal:

| Frequency | Meter Reading | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limits   | Margin | Detector Type |
|-----------|---------------|----------------|------------|---------------|----------------|----------|--------|---------------|
| (MHz)     | (dBμV)        | (dB/m)         | (dB)       | (dB)          | (dBμV/m)       | (dBμV/m) | (dB)   |               |
| 4924      | 53.07         | 31.40          | 9.17       | 32.10         | 61.54          | 74       | -12.46 | peak          |
| 4924      | 35.88         | 31.40          | 9.17       | 32.10         | 44.35          | 54       | -9.65  | AVG           |
| 7386      | 45.61         | 35.80          | 10.83      | 31.40         | 60.84          | 74       | -13.16 | peak          |
| 7386      | 28.54         | 35.80          | 10.83      | 31.40         | 43.77          | 54       | -10.23 | AVG           |
| ---       | ---           |                |            | ---           | ---            | ---      | ---    | ---           |
| ---       | ---           |                |            | ---           | ---            | ---      | ---    | ---           |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

## Vertical:

| Frequency | Meter Reading | Antenna Factor | Cable Loss | Preamp Factor | Emission Level | Limits   | Margin | Detector Type |
|-----------|---------------|----------------|------------|---------------|----------------|----------|--------|---------------|
| (MHz)     | (dBμV)        | (dB/m)         | (dB)       | (dB)          | (dBμV/m)       | (dBμV/m) | (dB)   |               |
| 4924      | 49.65         | 31.40          | 9.17       | 32.10         | 58.12          | 74       | -15.88 | peak          |
| 4924      | 37.15         | 31.40          | 9.17       | 32.10         | 45.62          | 54       | -8.38  | AVG           |
| 7386      | 43.79         | 35.80          | 10.83      | 31.40         | 59.02          | 74       | -14.98 | peak          |
| 7386      | 28.64         | 35.80          | 10.83      | 31.40         | 43.87          | 54       | -10.13 | AVG           |
| ---       | ---           |                |            | ---           | ---            | ---      | ---    | ---           |
| ---       | ---           |                |            | ---           | ---            | ---      | ---    | ---           |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

## Remark:

(1) Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

(2) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed.



## 7. Test Setup Photo

Reference to the **appendix I** for details.

## 8. EUT Constructional Details

Reference to the **appendix II** for details.

-----End-----