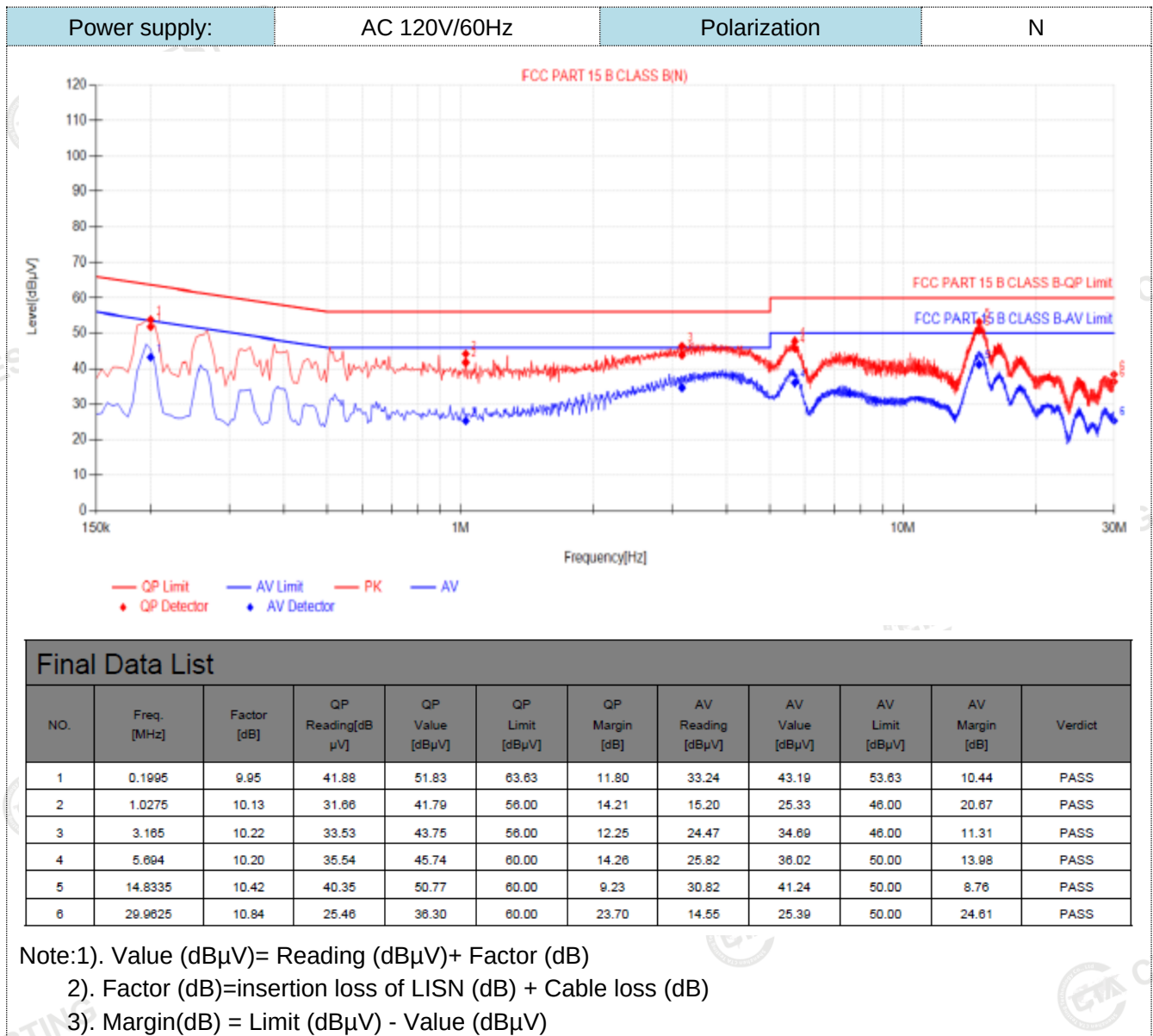
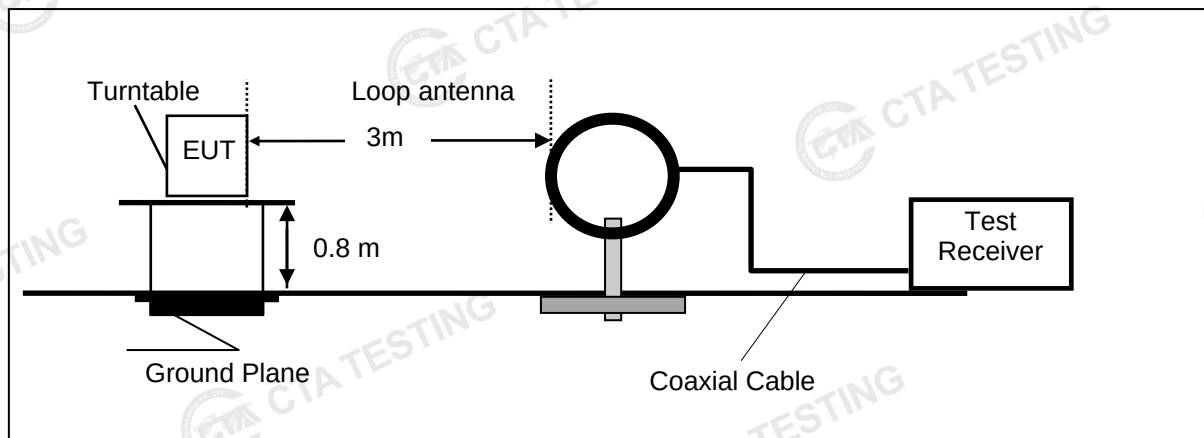




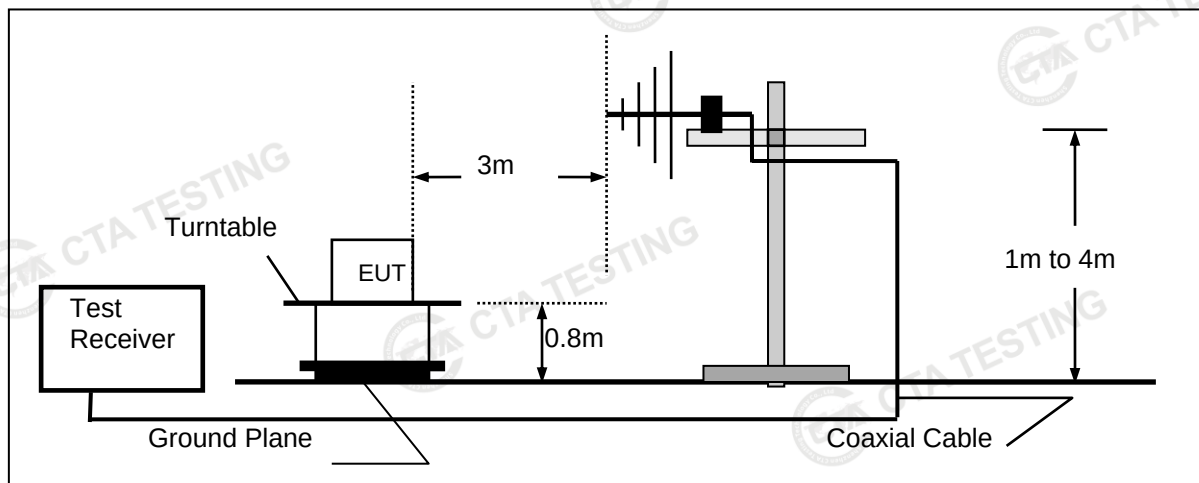
## Radiated Emission

**TEST CONFIGURATION**

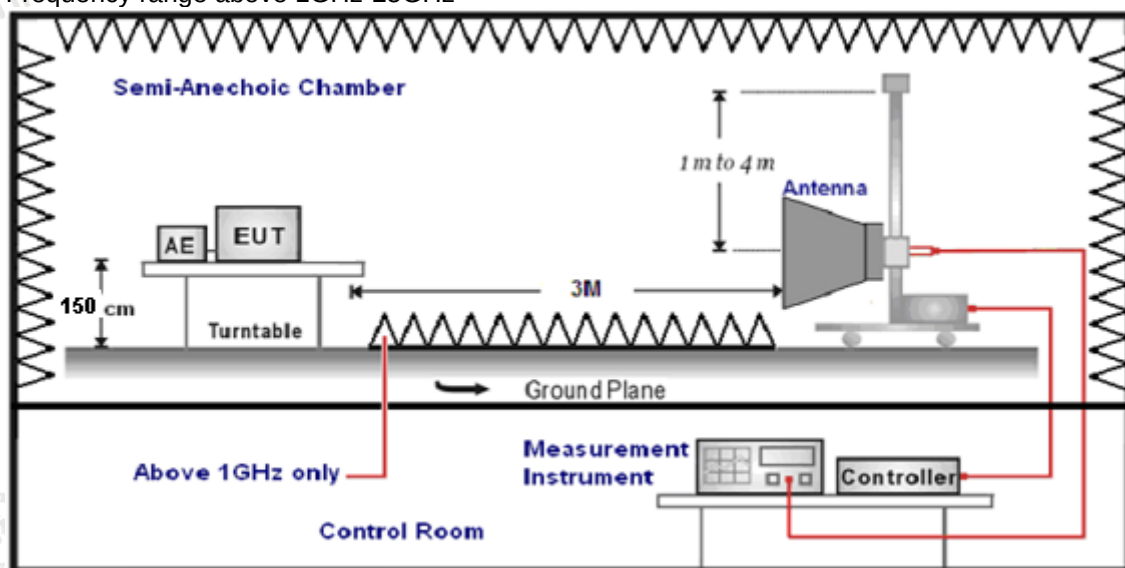
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz

**TEST PROCEDURE**

Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

Tel: +86-755 2322 5875 E-mail: cta@cta-test.cn Web: http://www.cta-test.cn

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz;the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz – 25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. Radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

| Test Frequency range | Test Antenna Type          | Test Distance |
|----------------------|----------------------------|---------------|
| 9KHz-30MHz           | Active Loop Antenna        | 3             |
| 30MHz-1GHz           | Ultra-Broadband Antenna    | 3             |
| 1GHz-18GHz           | Double Ridged Horn Antenna | 3             |
| 18GHz-25GHz          | Horn Antenna               | 1             |

7. Setting test receiver/spectrum as following table states:

| Test Frequency range | Test Receiver/Spectrum Setting                                                                            | Detector |
|----------------------|-----------------------------------------------------------------------------------------------------------|----------|
| 9KHz-150KHz          | RBW=200Hz/VBW=3KHz,Sweep time=Auto                                                                        | QP       |
| 150KHz-30MHz         | RBW=9KHz/VBW=100KHz,Sweep time=Auto                                                                       | QP       |
| 30MHz-1GHz           | RBW=120KHz/VBW=1000KHz,Sweep time=Auto                                                                    | QP       |
| 1GHz-40GHz           | Peak Value: RBW=1MHz/VBW=3MHz,<br>Sweep time=Auto<br>Average Value: RBW=1MHz/VBW=10Hz,<br>Sweep time=Auto | Peak     |

### Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

|                           |                                            |
|---------------------------|--------------------------------------------|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude    | AG = Amplifier Gain                        |
| AF = Antenna Factor       |                                            |

$$\text{Transd}=AF +CL-AG$$

### RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power.

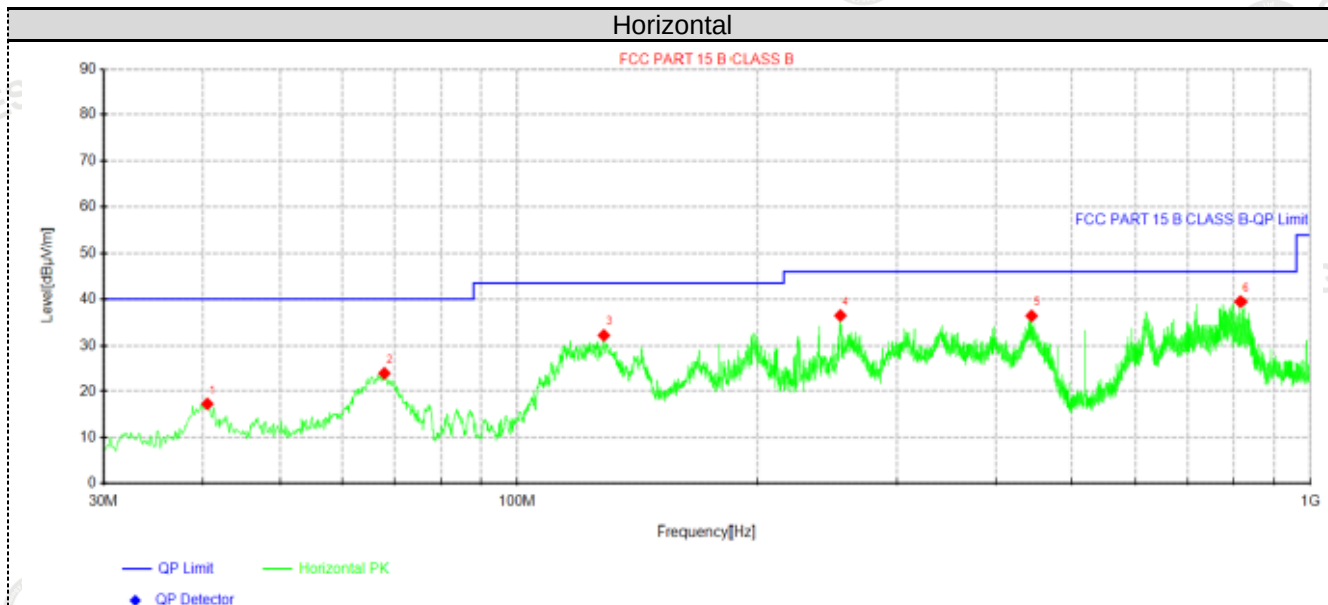
The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

| Frequency (MHz) | Distance (Meters) | Radiated (dBμV/m)                          | Radiated (μV/m)       |
|-----------------|-------------------|--------------------------------------------|-----------------------|
| 0.009-0.49      | 3                 | $20\log(2400/F(\text{KHz}))+40\log(300/3)$ | $2400/F(\text{KHz})$  |
| 0.49-1.705      | 3                 | $20\log(24000/F(\text{KHz}))+40\log(30/3)$ | $24000/F(\text{KHz})$ |
| 1.705-30        | 3                 | $20\log(30)+40\log(30/3)$                  | 30                    |
| 30-88           | 3                 | 40.0                                       | 100                   |
| 88-216          | 3                 | 43.5                                       | 150                   |
| 216-960         | 3                 | 46.0                                       | 200                   |
| Above 960       | 3                 | 54.0                                       | 500                   |

**TEST RESULTS**

Remark:

1. This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.
2. All three channels (lowest/middle/highest) of each mode were measured below 1GHz and recorded worst case at 802.11b low channel.
3. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

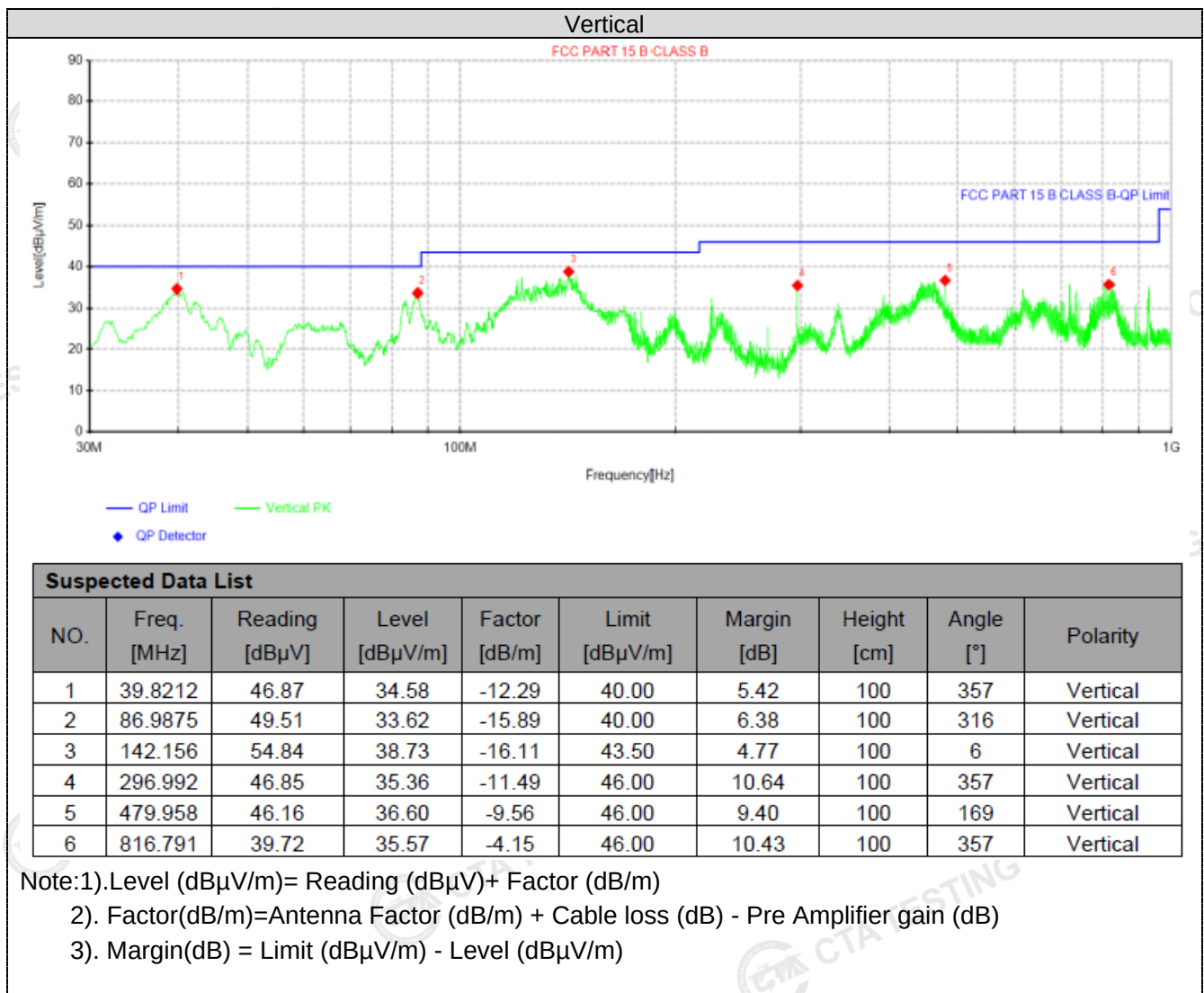
**For 30MHz-1GHz****Suspected Data List**

| NO. | Freq.<br>[MHz] | Reading<br>[dBμV] | Level<br>[dBμV/m] | Factor<br>[dB/m] | Limit<br>[dBμV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |
|-----|----------------|-------------------|-------------------|------------------|-------------------|----------------|----------------|--------------|------------|
| 1   | 40.5488        | 29.42             | 17.24             | -12.18           | 40.00             | 22.76          | 100            | 305          | Horizontal |
| 2   | 67.9512        | 38.57             | 23.94             | -14.63           | 40.00             | 16.06          | 100            | 203          | Horizontal |
| 3   | 128.576        | 48.95             | 32.26             | -16.69           | 43.50             | 11.24          | 100            | 157          | Horizontal |
| 4   | 254.312        | 48.95             | 36.39             | -12.56           | 46.00             | 9.61           | 100            | 248          | Horizontal |
| 5   | 444.19         | 46.37             | 36.32             | -10.05           | 46.00             | 9.68           | 100            | 66           | Horizontal |
| 6   | 816.791        | 43.58             | 39.43             | -4.15            | 46.00             | 6.57           | 100            | 270          | Horizontal |

Note:1).Level (dBμV/m)= Reading (dBμV)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin(dB) = Limit (dBμV/m) - Level (dBμV/m)





**For 1GHz to 25GHz**

Note: 802.11b/802.11g/802.11n (H20) Mode all have been tested, only worse case 802.11b mode is reported

(above 1GHz)

| Frequency(MHz): |                         |    | 2412           |             | Polarity:        |                       | HORIZONTAL        |                    |                          |
|-----------------|-------------------------|----|----------------|-------------|------------------|-----------------------|-------------------|--------------------|--------------------------|
| Frequency (MHz) | Emission Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4824.00         | 61.01                   | PK | 74             | 12.99       | 65.37            | 32.4                  | 5.11              | 41.87              | -4.36                    |
| 4824.00         | 47.10                   | AV | 54             | 6.90        | 51.46            | 32.4                  | 5.11              | 41.87              | -4.36                    |
| 7236.00         | 55.79                   | PK | 74             | 18.21       | 56.42            | 36.58                 | 6.43              | 43.64              | -0.63                    |
| 7236.00         | 43.93                   | AV | 54             | 10.07       | 44.56            | 36.58                 | 6.43              | 43.64              | -0.63                    |

| Frequency(MHz): |                         |    | 2412           |             | Polarity:        |                       | VERTICAL          |                    |                          |
|-----------------|-------------------------|----|----------------|-------------|------------------|-----------------------|-------------------|--------------------|--------------------------|
| Frequency (MHz) | Emission Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4824.00         | 59.63                   | PK | 74             | 14.37       | 63.99            | 32.4                  | 5.11              | 41.87              | -4.36                    |
| 4824.00         | 45.02                   | AV | 54             | 8.98        | 49.38            | 32.4                  | 5.11              | 41.87              | -4.36                    |
| 7236.00         | 53.60                   | PK | 74             | 20.40       | 54.23            | 36.58                 | 6.43              | 43.64              | -0.63                    |
| 7236.00         | 42.44                   | AV | 54             | 11.56       | 43.07            | 36.58                 | 6.43              | 43.64              | -0.63                    |

| Frequency(MHz): |                         |    | 2437           |             | Polarity:        |                       | HORIZONTAL        |                    |                          |
|-----------------|-------------------------|----|----------------|-------------|------------------|-----------------------|-------------------|--------------------|--------------------------|
| Frequency (MHz) | Emission Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4874.00         | 60.26                   | PK | 74             | 13.74       | 64.21            | 32.56                 | 5.34              | 41.85              | -3.95                    |
| 4874.00         | 44.32                   | AV | 54             | 9.68        | 48.27            | 32.56                 | 5.34              | 41.85              | -3.95                    |
| 7311.00         | 54.84                   | PK | 74             | 19.16       | 55.20            | 36.54                 | 6.81              | 43.71              | -0.36                    |
| 7311.00         | 43.18                   | AV | 54             | 10.82       | 43.54            | 36.54                 | 6.81              | 43.71              | -0.36                    |

| Frequency(MHz): |                         |    | 2437           |             | Polarity:        |                       | VERTICAL          |                    |                          |
|-----------------|-------------------------|----|----------------|-------------|------------------|-----------------------|-------------------|--------------------|--------------------------|
| Frequency (MHz) | Emission Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4874.00         | 58.63                   | PK | 74             | 15.37       | 62.58            | 32.56                 | 5.34              | 41.85              | -3.95                    |
| 4874.00         | 42.86                   | AV | 54             | 11.14       | 46.81            | 32.56                 | 5.34              | 41.85              | -3.95                    |
| 7311.00         | 52.61                   | PK | 74             | 21.39       | 52.97            | 36.54                 | 6.81              | 43.71              | -0.36                    |
| 7311.00         | 41.45                   | AV | 54             | 12.55       | 41.81            | 36.54                 | 6.81              | 43.71              | -0.36                    |

| Frequency(MHz): |                         |    | 2462           |             | Polarity:        |                       | HORIZONTAL        |                    |                          |
|-----------------|-------------------------|----|----------------|-------------|------------------|-----------------------|-------------------|--------------------|--------------------------|
| Frequency (MHz) | Emission Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4924.00         | 59.65                   | PK | 74             | 14.35       | 63.11            | 32.73                 | 5.64              | 41.83              | -3.46                    |
| 4924.00         | 46.68                   | AV | 54             | 7.32        | 50.14            | 32.73                 | 5.64              | 41.83              | -3.46                    |
| 7386.00         | 53.77                   | PK | 74             | 20.23       | 53.83            | 36.5                  | 7.23              | 43.79              | -0.06                    |
| 7386.00         | 43.17                   | PK | 54             | 10.83       | 43.23            | 36.5                  | 7.23              | 43.79              | -0.06                    |

| Frequency(MHz): |                         |    | 2462           |             | Polarity:        |                       | VERTICAL          |                    |                          |
|-----------------|-------------------------|----|----------------|-------------|------------------|-----------------------|-------------------|--------------------|--------------------------|
| Frequency (MHz) | Emission Level (dBuV/m) |    | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 4924.00         | 57.94                   | PK | 74             | 16.06       | 61.40            | 32.73                 | 5.64              | 41.83              | -3.46                    |
| 4924.00         | 44.18                   | AV | 54             | 9.82        | 47.64            | 32.73                 | 5.64              | 41.83              | -3.46                    |
| 7386.00         | 52.39                   | PK | 74             | 21.61       | 52.45            | 36.5                  | 7.23              | 43.79              | -0.06                    |
| 7386.00         | 41.71                   | PK | 54             | 12.29       | 41.77            | 36.5                  | 7.23              | 43.79              | -0.06                    |