



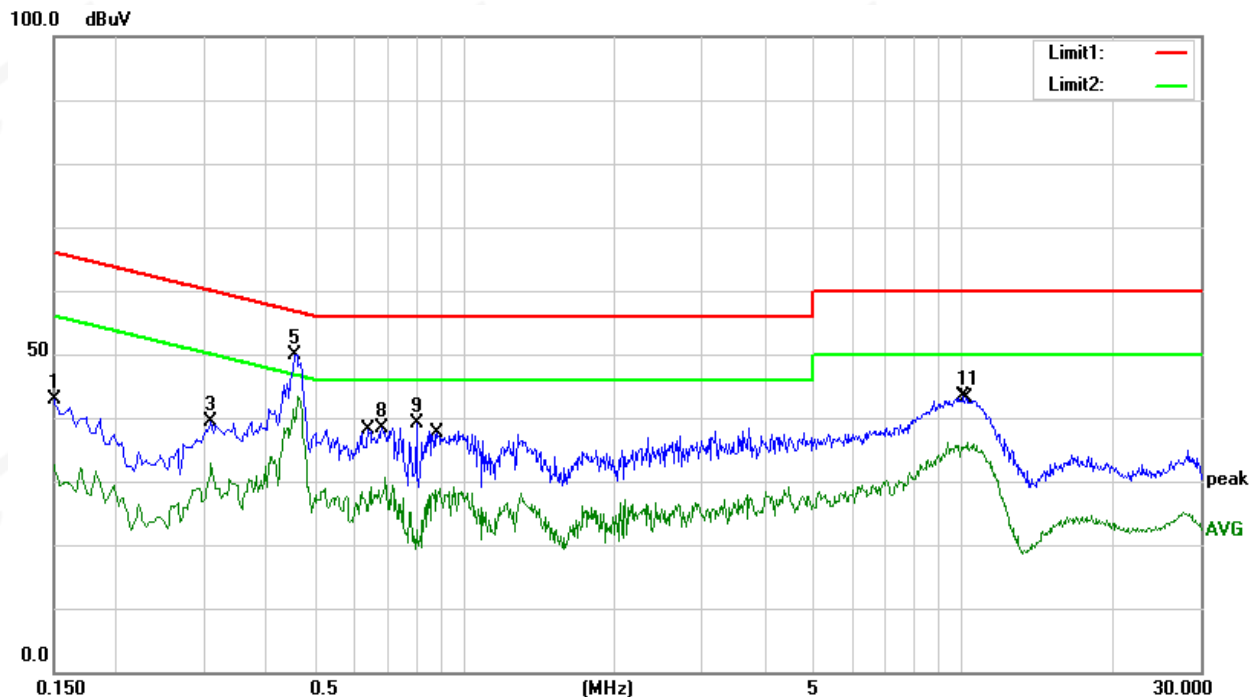
## 3.1.5 TEST RESULT

|               |              |                    |     |
|---------------|--------------|--------------------|-----|
| Temperature:  | 25.1°C       | Relative Humidity: | 59% |
| Test Voltage: | AC 120V/60Hz | Phase:             | L   |
| Test Mode:    | Mode 4       |                    |     |

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-----------------------|------------------|-----------------|----------------|--------|
| 1   | 0.1500             | 23.09             | 19.78                 | 42.87            | 66.00           | -23.13         | QP     |
| 2   | 0.1500             | 12.81             | 19.78                 | 32.59            | 56.00           | -23.41         | AVG    |
| 3   | 0.3100             | 19.18             | 20.20                 | 39.38            | 59.97           | -20.59         | QP     |
| 4   | 0.3100             | 12.64             | 20.20                 | 32.84            | 49.97           | -17.13         | AVG    |
| 5   | 0.4580             | 29.87             | 20.01                 | 49.88            | 56.73           | -6.85          | QP     |
| 6   | 0.4620             | 23.41             | 20.01                 | 43.42            | 46.66           | -3.24          | AVG    |
| 7   | 0.6500             | 9.16              | 19.87                 | 29.03            | 46.00           | -16.97         | QP     |
| 8   | 0.6860             | 18.55             | 19.83                 | 38.38            | 56.00           | -17.62         | AVG    |
| 9   | 0.8020             | 19.25             | 19.80                 | 39.05            | 56.00           | -16.95         | QP     |
| 10  | 0.8740             | 8.87              | 19.79                 | 28.66            | 46.00           | -17.34         | AVG    |
| 11  | 10.0380            | 23.18             | 20.27                 | 43.45            | 60.00           | -16.55         | QP     |
| 12  | 10.2140            | 15.79             | 20.28                 | 36.07            | 50.00           | -13.93         | AVG    |

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result = Reading + Factor) – Limit



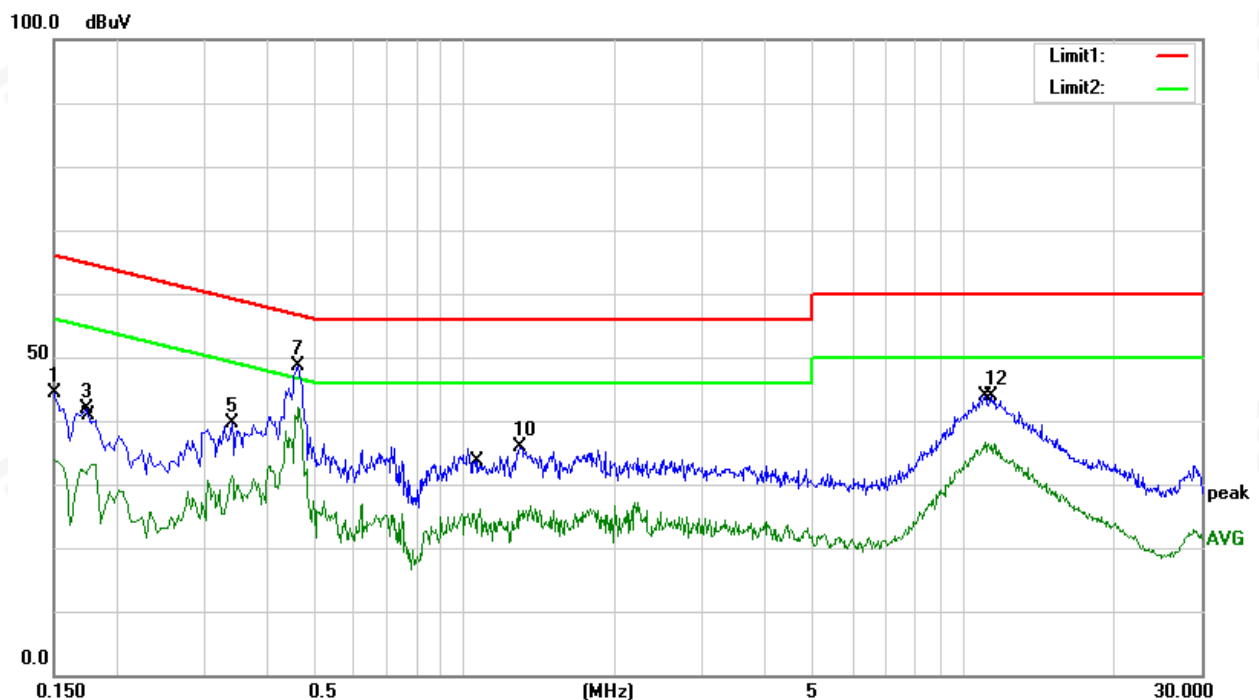


|               |              |                    |     |
|---------------|--------------|--------------------|-----|
| Temperature:  | 25.1°C       | Relative Humidity: | 59% |
| Test Voltage: | AC 120V/60Hz | Phase:             | N   |
| Test Mode:    | Mode 4       |                    |     |

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-----------------------|------------------|-----------------|----------------|--------|
| 1   | 0.1500             | 24.64             | 19.74                 | 44.38            | 66.00           | -21.62         | QP     |
| 2   | 0.1500             | 14.25             | 19.74                 | 33.99            | 56.00           | -22.01         | AVG    |
| 3   | 0.1740             | 21.97             | 19.80                 | 41.77            | 64.77           | -23.00         | QP     |
| 4   | 0.1780             | 13.32             | 19.81                 | 33.13            | 54.58           | -21.45         | AVG    |
| 5   | 0.3420             | 19.58             | 20.17                 | 39.75            | 59.15           | -19.40         | QP     |
| 6   | 0.3420             | 11.09             | 20.17                 | 31.26            | 49.15           | -17.89         | AVG    |
| 7   | 0.4620             | 28.58             | 19.99                 | 48.57            | 56.66           | -8.09          | QP     |
| 8   | 0.4660             | 22.03             | 19.99                 | 42.02            | 46.58           | -4.56          | AVG    |
| 9   | 1.0740             | 6.25              | 19.78                 | 26.03            | 46.00           | -19.97         | QP     |
| 10  | 1.2900             | 16.00             | 19.80                 | 35.80            | 56.00           | -20.20         | AVG    |
| 11  | 11.0460            | 16.48             | 20.05                 | 36.53            | 50.00           | -13.47         | QP     |
| 12  | 11.3820            | 23.87             | 20.07                 | 43.94            | 60.00           | -16.06         | AVG    |

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor )–Limit





### 3.2 RADIATED EMISSION MEASUREMENT

#### 3.2.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on Part 15.249 and the Part 15.209(a) limit in the table below has to be followed.

Standard FCC 15.209

| Frequencies<br>(MHz) | Field Strength<br>(micorvolts/meter)                  | Measurement Distance<br>(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                                |
| 960~1000             | 500                                                   | 3                                |
| Above 1000           | Other:74.0 dB(μV)/m (Peak)<br>54.0 dB(μV)/m (Average) | 3                                |

Standard FCC 15.249

| Frequency of Emission<br>(MHz) | Field Strength of<br>fundamental<br>(millivolts /meter) | Field Strength of<br>Harmonics<br>(microvolts/meter) |
|--------------------------------|---------------------------------------------------------|------------------------------------------------------|
| 900~928                        | 50                                                      | 500                                                  |
| 2400~2483.5                    | 50                                                      | 500                                                  |
| 5725~5875                      | 50                                                      | 500                                                  |
| 24000~242500                   | 250                                                     | 2500                                                 |

Notes:

- (1) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.
- (2) Emission level (dBuV/m) = 20log Emission level (uV/m).

#### LIMITS OF RESTRICTED FREQUENCY BANDS

| FREQUENCY (MHz) | FREQUENCY (MHz)   | FREQUENCY (MHz) | FREQUENCY (GHz) |
|-----------------|-------------------|-----------------|-----------------|
| 0.090-0.110     | 16.42-16.423      | 399.9-410       | 4.5-5.15        |
| 0.495-0.505     | 16.69475-16.69525 | 608-614         | 5.35-5.46       |
| 2.1735-2.1905   | 16.80425-16.80475 | 960-1240        | 7.25-7.75       |
| 4.125-4.128     | 25.5-25.67        | 1300-1427       | 8.025-8.5       |
| 4.17725-4.17775 | 37.5-38.25        | 1435-1626.5     | 9.0-9.2         |
| 4.20725-4.20775 | 73-74.6           | 1645.5-1646.5   | 9.3-9.5         |
| 6.215-6.218     | 74.8-75.2         | 1660-1710       | 10.6-12.7       |



|                   |                     |               |             |
|-------------------|---------------------|---------------|-------------|
| 6.26775-6.26825   | 108-121.94          | 1718.8-1722.2 | 13.25-13.4  |
| 6.31175-6.31225   | 123-138             | 2200-2300     | 14.47-14.5  |
| 8.291-8.294       | 149.9-150.05        | 2310-2390     | 15.35-16.2  |
| 8.362-8.366       | 156.52475-156.52525 | 2483.5-2500   | 17.7-21.4   |
| 8.37625-8.38675   | 156.7-156.9         | 2690-2900     | 22.01-23.12 |
| 8.41425-8.41475   | 162.0125-167.17     | 3260-3267     | 23.6-24.0   |
| 12.29-12.293      | 167.72-173.2        | 3332-3339     | 31.2-31.8   |
| 12.51975-12.52025 | 240-285             | 3345.8-3358   | 36.43-36.5  |
| 12.57675-12.57725 | 322-335.4           | 3600-4400     | Above 38.6  |
| 13.36-13.41       |                     |               |             |

| Spectrum Parameter               | Setting               |
|----------------------------------|-----------------------|
| Detector                         | Peak/AV               |
| Attenuation                      | Auto                  |
| Start Frequency                  | 1000 MHz              |
| Stop Frequency                   | 10th carrier harmonic |
| RB (emission in restricted band) | >20BW                 |
| VB (emission in restricted band) | =3xRB                 |

| Receiver Parameter     | Setting                              |
|------------------------|--------------------------------------|
| Attenuation            | Auto                                 |
| Start ~ Stop Frequency | 9kHz~90kHz / RB 200Hz for PK & AV    |
|                        | 90kHz~110kHz / RB 200Hz for QP       |
|                        | 110kHz~490kHz / RB 200Hz for PK & AV |
|                        | 490kHz~30MHz / RB 9kHz for QP        |
|                        | 30MHz~1000MHz / RB 120kHz for QP     |



### 3.2.2 TEST PROCEDURE

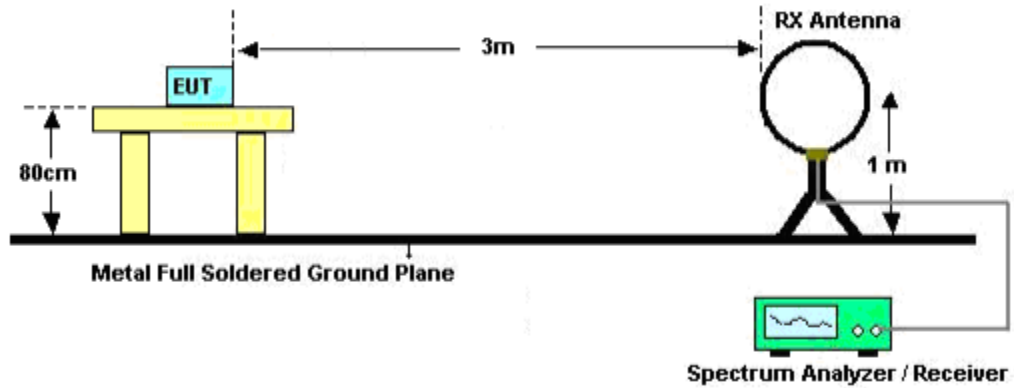
- a. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation (Below 1GHz)
- b. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation (Above 1GHz)
- c. The height of the test antenna shall vary between 1m to 4m. Both horizontal and vertical polarization of the antenna are set to make the measurement.
- d. The initial step in collecting radiated emission data is a receive peak detector mode. Pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. All readings are peak unless otherwise stated QP in column of Note. Peak denoted that the Peak reading complies with the QP limits and then QP Mode measurement didn't perform (Below 1GHz)
- f. All readings are Peak mode value unless otherwise stated AVG in column of Note. If the Peak mode measured value complies with the Peak limits and lower than AVG Limits, the EUT shall be deemed to meet Peak & AVG limits and then only Peak mode was measured, but AVG mode didn't perform. (Above 1GHz)
- g. For the actual test configuration, please refer to the related Item –EUT Test Photos.  
Note: Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axes. The worst case emissions were reported.

### 3.2.3 DEVIATION FROM TEST STANDARD

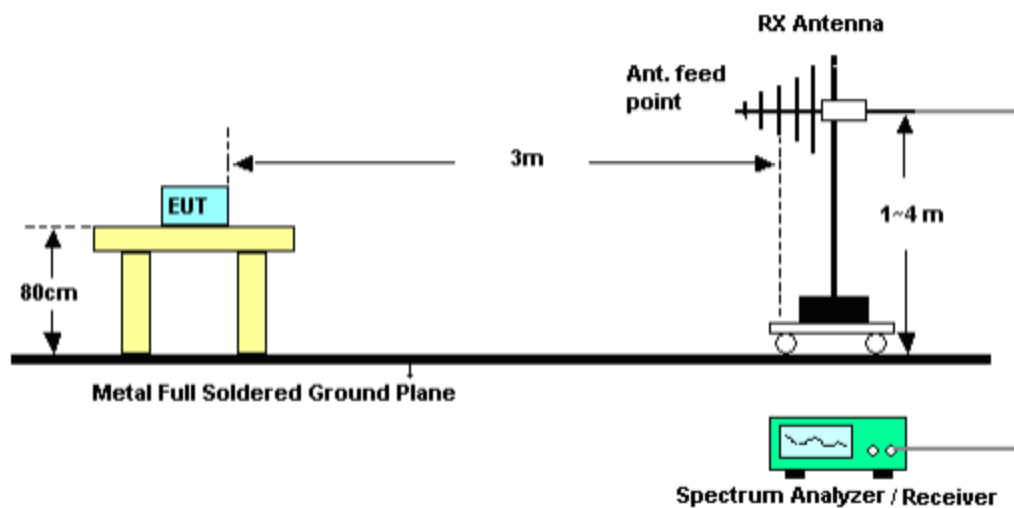
No deviation

### 3.2.4 TEST SETUP

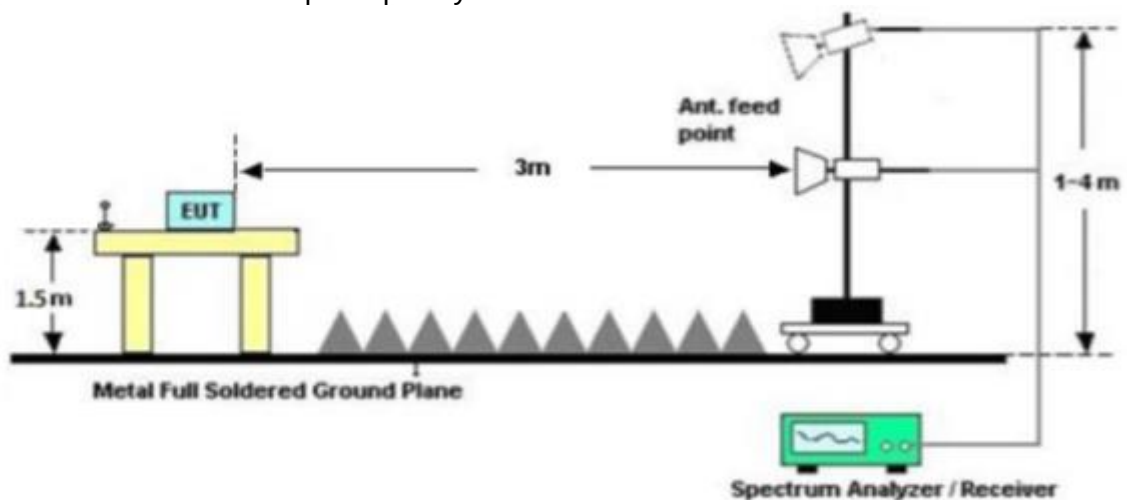
#### (A) Radiated Emission Test-Up Frequency Below 30MHz



#### (B) Radiated Emission Test-Up Frequency 30MHz~1GHz



#### (C) Radiated Emission Test-Up Frequency Above 1GHz





### 3.2.5 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:

Margin=PL-PK L or AL- AV L; Margin only shown the worst case.

Where

PR = Peak Reading

AR = Average Reading

PL = Peak Level

AL = Average Level

AF = Antenna Factor

PK L = Peak Limit

AV L = AV Limit

For example

| Frequency | PR       | AR       | AF   | PL       | AL       | PK L     | AV L     | Margin |
|-----------|----------|----------|------|----------|----------|----------|----------|--------|
| (MHz)     | (dBμV/m) | (dBμV/m) | (dB) | (dBμV/m) | (dBμV/m) | (dBμV/m) | (dBμV/m) | (dB)   |
| 2178      | 40.23    | 30.31    | 9.83 | 50.06    | 40.14    | 74.00    | 54.00    | -13.86 |



### 3.2.6 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

Below 30 MHz

|               |              |                    |     |
|---------------|--------------|--------------------|-----|
| Temperature:  | 23.4°C       | Relative Humidity: | 60% |
| Test Voltage: | AC 120V/60Hz | Polarization:      | --- |
| Test Mode:    | TX Mode      |                    |     |

| Freq. | Reading  | Limit    | Margin | State |
|-------|----------|----------|--------|-------|
| (MHz) | (dBuV/m) | (dBuV/m) | (dB)   | P/F   |
| --    | --       | --       | --     | PASS  |
| --    | --       | --       | --     | PASS  |

**NOTE:**

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log (\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.



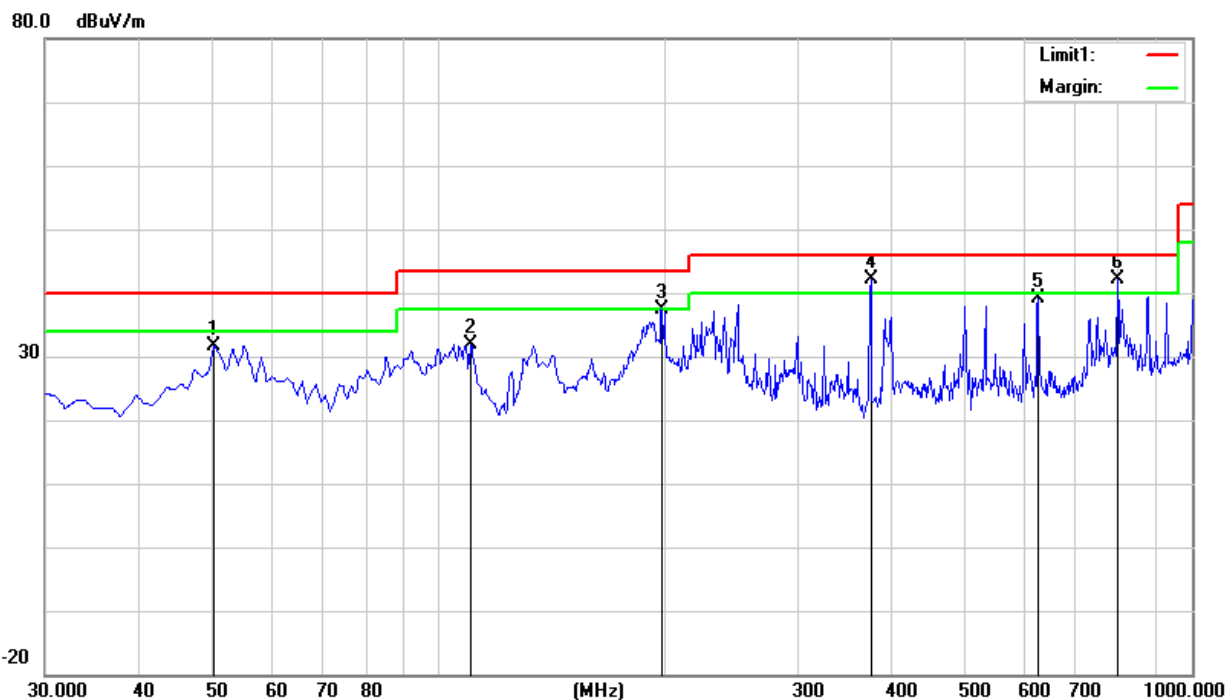
## Between 30MHz – 1000 MHz Radiation Spurious

|               |                             |                    |            |
|---------------|-----------------------------|--------------------|------------|
| Temperature:  | 23.4℃                       | Relative Humidity: | 60%        |
| Test Voltage: | AC 120V/60Hz                | Phase:             | Horizontal |
| Test Mode:    | Mode 1/2/3(mode 2wost mode) |                    |            |

| No. | Frequency<br>(MHz) | Reading<br>(dBUV) | Correct<br>Factor(dB/m) | Result<br>(dBUV/m) | Limit<br>(dBUV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|--------|
| 1   | 50.3700            | 55.04             | -23.42                  | 31.62              | 40.00             | -8.38          | peak   |
| 2   | 110.5100           | 50.85             | -19.01                  | 31.84              | 43.50             | -11.66         | peak   |
| 3   | 197.8928           | 58.56             | -21.12                  | 37.44              | 43.50             | -6.06          | peak   |
| 4   | 375.3200           | 54.47             | -12.37                  | 42.10              | 46.00             | -3.90          | peak   |
| 5   | 625.5800           | 44.32             | -5.25                   | 39.07              | 46.00             | -6.93          | peak   |
| 6   | 796.3000           | 44.09             | -2.02                   | 42.07              | 46.00             | -3.93          | peak   |

Remark:

1. Margin = Result (Result =Reading + Factor )–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain
3. All Antenna port have been tested,only show the worst case





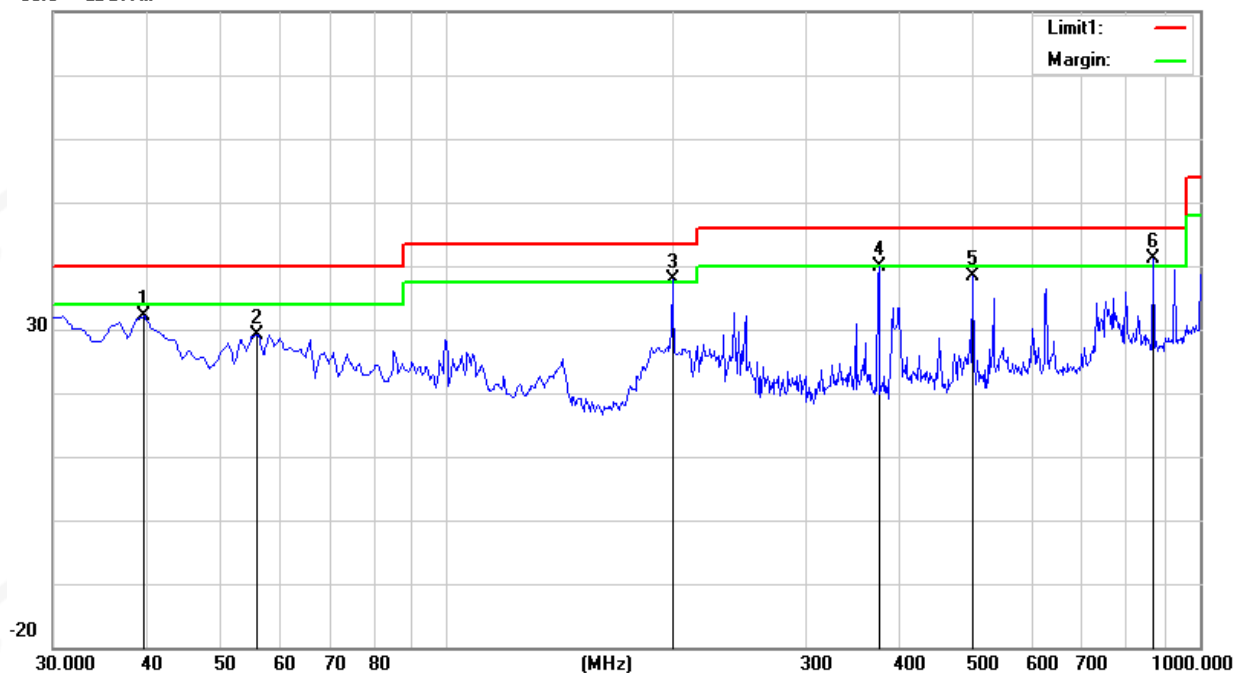
|               |                             |                    |          |
|---------------|-----------------------------|--------------------|----------|
| Temperature:  | 23.4°C                      | Relative Humidity: | 60%      |
| Test Voltage: | AC 120V/60Hz                | Phase:             | Vertical |
| Test Mode:    | Mode 1/2/3(mode 2wost mode) |                    |          |

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-------------------------|--------------------|-------------------|----------------|--------|
| 1   | 39.7000            | 49.98             | -17.88                  | 32.10              | 40.00             | -7.90          | peak   |
| 2   | 56.1900            | 54.47             | -25.30                  | 29.17              | 40.00             | -10.83         | peak   |
| 3   | 199.7500           | 59.06             | -21.11                  | 37.95              | 43.50             | -5.55          | peak   |
| 4   | 375.3200           | 52.23             | -12.37                  | 39.86              | 46.00             | -6.14          | peak   |
| 5   | 500.4500           | 46.29             | -8.01                   | 38.28              | 46.00             | -7.72          | peak   |
| 6   | 869.0500           | 41.70             | -0.52                   | 41.18              | 46.00             | -4.82          | peak   |

Remark:

1. Margin = Result (Result =Reading + Factor )-Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain
3. All Antenna port have been tested,only show the worst case

80.0 dBuV/m



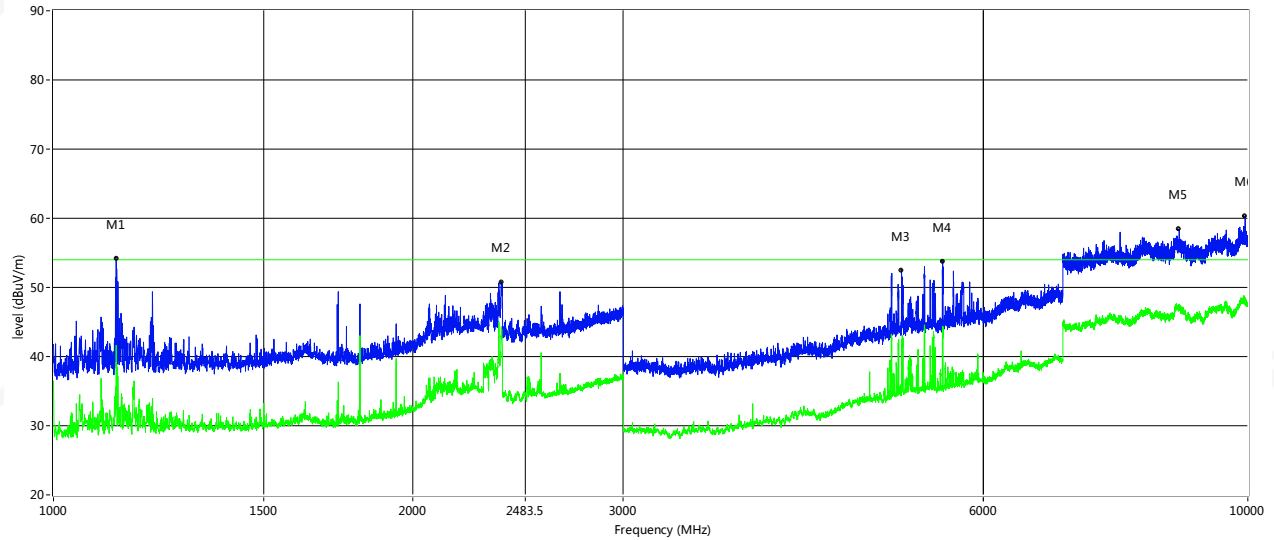


## Above 1G Radiation Spurious

902.75MHz

Horizontal

RE\_FCC Test Case\_FCC 15C 1GHz-10GHz

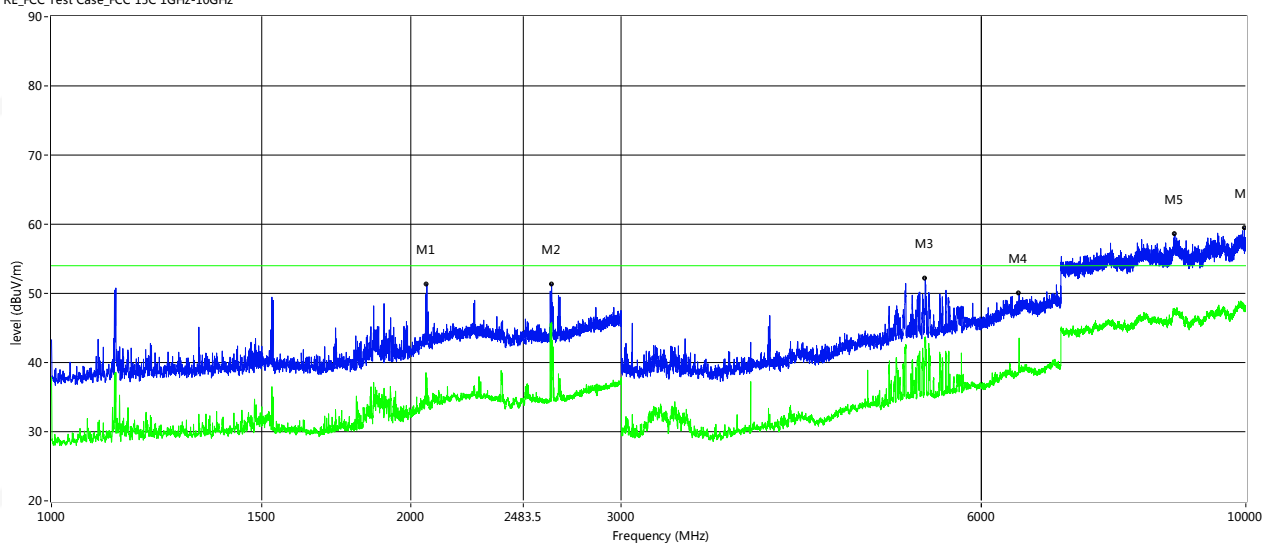


| Frequency (MHz) | Peak Level (dBuV /m) | Average Level (dBuV /m) | Factor (dB) | PK Limit (dBuV /m) | AV Limit (dBuV /m) | Over Limit (dB) | Table (o) | Height (cm) | ANT        | Verdict |
|-----------------|----------------------|-------------------------|-------------|--------------------|--------------------|-----------------|-----------|-------------|------------|---------|
| 1128.500        | 54.11                | 41.61                   | -1.43       | 74.0               | 54.0               | -12.39          | 233.80    | 100         | Horizontal | Pass    |
| 2371.000        | 50.77                | 44.27                   | 4.21        | 74.0               | 54.0               | -9.73           | 278.80    | 100         | Horizontal | Pass    |
| 5130.000        | 52.43                | 42.29                   | -5.34       | 74.0               | 54.0               | -11.71          | 289.20    | 100         | Horizontal | Pass    |
| 5552.000        | 53.74                | 44.25                   | -4.54       | 74.0               | 54.0               | -9.75           | 118.70    | 100         | Horizontal | Pass    |
| 8761.000        | 58.42                | 47.29                   | 4.97        | 74.0               | 54.0               | -6.71           | 310.20    | 100         | Horizontal | Pass    |
| 9948.250        | 60.29                | 48.28                   | 5.81        | 74.0               | 54.0               | -5.72           | 347.10    | 100         | Horizontal | Pass    |



## Vertical

RE\_FCC Test Case\_FCC 15C 1GHz-10GHz



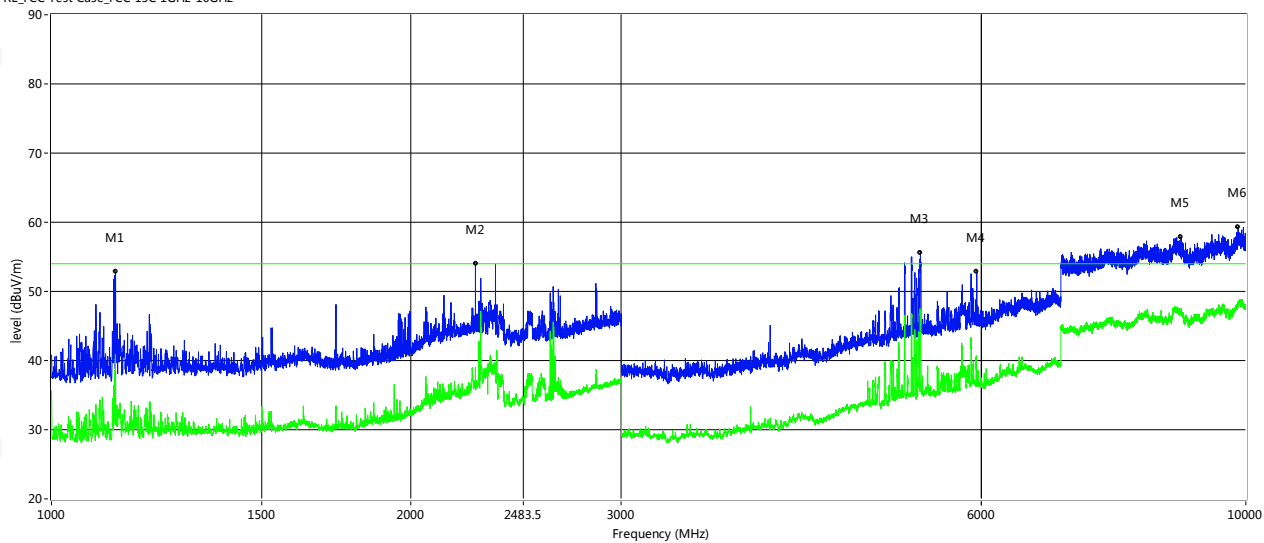
| Frequency (MHz) | Peak Level (dBuV /m) | Average Level (dBuV /m) | Factor (dB) | PK Limit (dBuV /m) | AV Limit (dBuV /m) | Over Limit (dB) | Table (o) | Height (cm) | ANT      | Verdict |
|-----------------|----------------------|-------------------------|-------------|--------------------|--------------------|-----------------|-----------|-------------|----------|---------|
| 2062.000        | 51.33                | 37.81                   | 3.06        | 74.0               | 54.0               | -16.19          | 111.00    | 100         | Vertical | Pass    |
| 2622.500        | 51.30                | 40.51                   | 4.24        | 74.0               | 54.0               | -13.49          | 291.90    | 100         | Vertical | Pass    |
| 5390.000        | 52.08                | 42.13                   | -4.78       | 74.0               | 54.0               | -11.87          | 348.50    | 100         | Vertical | Pass    |
| 6459.000        | 49.99                | 43.54                   | -0.76       | 74.0               | 54.0               | -10.46          | 29.40     | 100         | Vertical | Pass    |
| 8722.000        | 58.61                | 47.68                   | 5.09        | 74.0               | 54.0               | -6.32           | 205.20    | 100         | Vertical | Pass    |
| 9971.500        | 59.45                | 47.82                   | 5.51        | 74.0               | 54.0               | -6.18           | 149.00    | 100         | Vertical | Pass    |



915.25MHz

Horizontal

RE\_FCC Test Case\_FCC 15C 1GHz-10GHz



| Frequency (MHz) | Peak Level (dBuV/m) | Average Level (dBuV/m) | Factor (dB) | PK Limit (dBuV/m) | AV Limit (dBuV/m) | Over Limit (dB) | Table (o) | Height (cm) | ANT        | Verdict |
|-----------------|---------------------|------------------------|-------------|-------------------|-------------------|-----------------|-----------|-------------|------------|---------|
| 1131.500        | 52.81               | 37.57                  | -1.42       | 74.0              | 54.0              | -16.43          | 237.60    | 100         | Horizontal | Pass    |
| 2264.500        | 53.93               | 39.03                  | 4.62        | 74.0              | 54.0              | -14.97          | 146.30    | 100         | Horizontal | Pass    |
| 5340.000        | 55.51               | 46.64                  | -4.91       | 74.0              | 54.0              | -7.36           | 283.60    | 100         | Horizontal | Pass    |
| 5953.000        | 52.79               | 39.55                  | -3.12       | 74.0              | 54.0              | -14.45          | 289.20    | 100         | Horizontal | Pass    |
| 8825.500        | 57.85               | 47.12                  | 4.69        | 74.0              | 54.0              | -6.88           | 201.90    | 100         | Horizontal | Pass    |
| 9852.250        | 59.32               | 48.34                  | 6.32        | 74.0              | 54.0              | -5.66           | 308.30    | 100         | Horizontal | Pass    |