

## FCC Test Report

**Report No.:** RFBEOE-WTW-P22100607-2

**FCC ID:** MQT-JPMCR

**Test Model:** Chase Card Reader

**Received Date:** 2022/11/23

**Test Date:** 2022/12/12 ~ 2022/12/26

**Issued Date:** 2023/1/10

**Applicant:** XAC AUTOMATION CORP.

**Address:** 4F, No. 30, INDUSTRY E. RD. IX, SCIENCE-BASED INDUSTRIAL  
PARK,HSINCHU,TAIWAN

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Hsin Chu Laboratory

**Lab Address:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan

**Test Location:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan

**FCC Registration /  
Designation Number:** 723255 / TW2022



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### Release Control Record

| Issue No.              | Description       | Date Issued |
|------------------------|-------------------|-------------|
| RFBEOE-WTW-P22100607-2 | Original release. | 2023/1/10   |

## 1 Certificate of Conformity

**Product:** Mobile Card Reader

**Brand:** CHASE

**Test Model:** Chase Card Reader

**Sample Status:** Engineering sample

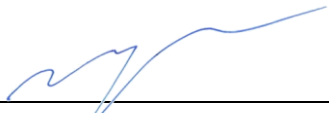
**Applicant:** XAC AUTOMATION CORP.

**Test Date:** 2022/12/12 ~ 2022/12/26

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.225)  
47 CFR FCC Part 15, Subpart C (Section 15.215)  
ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :** Vivian Huang , **Date:** 2023/1/10  
Vivian Huang / Specialist

**Approved by :**  , **Date:** 2023/1/10  
May Chen / Manager

## 2 Summary of Test Results

| 47 CFR FCC Part 15, Subpart C (Section 15.225, 15.215) |                                                                                              |        |                                                                                    |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------|--------|------------------------------------------------------------------------------------|
| FCC Clause                                             | Test Item                                                                                    | Result | Remarks                                                                            |
| 15.207                                                 | Conducted emission test                                                                      | Pass   | Meet the requirement of limit. Minimum passing margin is -3.87 dB at 23.62172 MHz. |
| 15.225 (a)                                             | The field strength of any emissions within the band 13.553-13.567 MHz                        | Pass   | Meet the requirement of limit. Minimum passing margin is -58.34 dB at 13.56 MHz.   |
| 15.225 (b)                                             | The field strength of any emissions within the bands 13.410-13.553 MHz and 13.567-13.710 MHz | Pass   | Meet the requirement of limit.                                                     |
| 15.225 (c)                                             | The field strength of any emissions within the bands 13.110-13.410 MHz and 13.710-14.010 MHz | Pass   | Meet the requirement of limit.                                                     |
| 15.225 (d)                                             | The field strength of any emissions appearing outside of the 13.110-14.010 MHz band          | Pass   | Meet the requirement of limit. Minimum passing margin is -3.6 dB at 30.71 MHz.     |
| 15.225 (e)                                             | The frequency tolerance                                                                      | Pass   | Meet the requirement of limit.                                                     |
| 15.215 (c)                                             | 20dB Bandwidth                                                                               | Pass   | Meet the requirement of limit.                                                     |
| 15.203                                                 | Antenna Requirement                                                                          | Pass   | No antenna connector is used.                                                      |

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| Measurement                        | Frequency      | Expanded Uncertainty (k=2) (±) |
|------------------------------------|----------------|--------------------------------|
| Conducted Emissions at mains ports | 150kHz ~ 30MHz | 1.9 dB                         |
| Radiated Emissions up to 1 GHz     | 9kHz ~ 30MHz   | 3.1 dB                         |
|                                    | 30MHz ~ 1GHz   | 5.1 dB                         |

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

|                     |                                                |
|---------------------|------------------------------------------------|
| Product             | Mobile Card Reader                             |
| Brand               | CHASE                                          |
| Test Model          | Chase Card Reader                              |
| Status of EUT       | Engineering sample                             |
| Power Supply Rating | 5 Vdc from POGO Pin or<br>3.8 Vdc from battery |
| Modulation Type     | ASK                                            |
| Transfer Rate       | Refer to Note                                  |
| Operating Frequency | 13.56MHz                                       |
| Number of Channel   | 1                                              |
| Antenna Type        | Refer to Note                                  |
| Antenna Connector   | Refer to Note                                  |
| Cable Supplied      | POGO PIN Cable (2 m) x 1                       |

Note:

1. There are WLAN, Bluetooth and NFC technology used for the EUT.
2. Simultaneously transmission condition.

| Condition | Technology     |     |
|-----------|----------------|-----|
| 1         | WLAN (2.4 GHz) | NFC |
| 2         | Bluetooth      | NFC |

3. The EUT must be supplied with a battery as the following table:

| Battery                               |        |                                    |
|---------------------------------------|--------|------------------------------------|
| Brand                                 | Model  | Specification                      |
| Huizhou HighpowerTechnology Co., Ltd. | 453335 | Power Rating: 3.8V, 680mAh, 2.58Wh |

4. The EUT has one type according to NFC technology as following table:

| Mode   | Type | Modulation | Data rate  |
|--------|------|------------|------------|
| Active | A    | 100%, ASK  | 106 kbit/s |

5. The antennas provided to the EUT, please refer to the following table:

| Antenna NO. | RF Chain NO. | Brand | Model        | Antenna Net Gain(dBi) | Frequency range | Antenna Type | Connector Type |
|-------------|--------------|-------|--------------|-----------------------|-----------------|--------------|----------------|
| WiFi/BT     | Main         | AWAN  | ALM00-000000 | 0.466                 | 2.4~2.5GHz      | PIFA         | none           |
| NFC         | Main         | XAC   | RTOS         | 5                     | 13.56MHz        | Loop         | none           |

6. For the radiated emissions, the EUT was pre-tested under the following modes:

| Test Mode                                                                                                                                     | Description                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| <b>Mode A</b>                                                                                                                                 | <b>Power from adapter</b>              |
| Mode B                                                                                                                                        | Power from battery                     |
| Mode C                                                                                                                                        | Power from Charging stand+Adapter mode |
| Note: From the above modes, the worst case was found in <b>Mode A</b> . Therefore only the test data of the mode was recorded in this report. |                                        |

7. For the conducted emissions, the EUT was pre-tested under the following modes:

| Test Mode                                                                                                                                     | Description                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| Mode A                                                                                                                                        | Power from adapter                            |
| Mode B                                                                                                                                        | Power from laptop                             |
| <b>Mode C</b>                                                                                                                                 | <b>Power from Charging stand+Adapter mode</b> |
| Note: From the above modes, the worst case was found in <b>Mode C</b> . Therefore only the test data of the mode was recorded in this report. |                                               |

8. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

9. Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

10. Only radiated measurements are used to show compliance with FCC limits for fundamental and spurious emissions.

### 3.2 Description of Test Modes

One channel was provided to this EUT:

| Channel | Frequency (MHz) |
|---------|-----------------|
| 1       | 13.56           |

#### 3.2.1 Test Mode Applicability and Tested Channel Detail

| EUT Configure Mode | Applicable to |     |    |    | Description |
|--------------------|---------------|-----|----|----|-------------|
|                    | RE            | PLC | FS | EB |             |
| -                  | √             | √   | √  | √  | -           |

Where

**RE:** Radiated Emission

**PLC:** Power Line Conducted Emission

**FS:** Frequency Stability

**EB:** 20dB Bandwidth measurement

**Note:** The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

#### Radiated Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| Available Channel | Tested Channel | Modulation Type |
|-------------------|----------------|-----------------|
| 1                 | 1              | ASK             |

#### Power Line Conducted Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| Available Channel | Tested Channel | Modulation Type |
|-------------------|----------------|-----------------|
| 1                 | 1              | ASK             |

#### Frequency Stability:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| Available Channel | Tested Channel | Modulation Type |
|-------------------|----------------|-----------------|
| 1                 | 1              | ASK             |

### **20dB Bandwidth:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| Available Channel | Tested Channel | Modulation Type |
|-------------------|----------------|-----------------|
| 1                 | 1              | ASK             |

### **Test Condition:**

| Applicable to | Environmental Conditions | Input Power              | Tested By                    |
|---------------|--------------------------|--------------------------|------------------------------|
| RE            | 25deg. C, 75%RH          | 120Vac, 60Hz<br>(System) | Sampson Chen,<br>Nelson Teng |
|               | 23deg. C, 71%RH          |                          |                              |
| PLC           | 21deg. C, 66%RH          | 120Vac, 60Hz<br>(System) | Sampson Chen                 |
| FS            | 25deg. C, 60%RH          | 3.8Vdc                   | Kevin Ko                     |
| EB            | 25deg. C, 60%RH          | 120Vac, 60Hz<br>(System) | Kevin Ko                     |

### 3.3 Description of Support Units

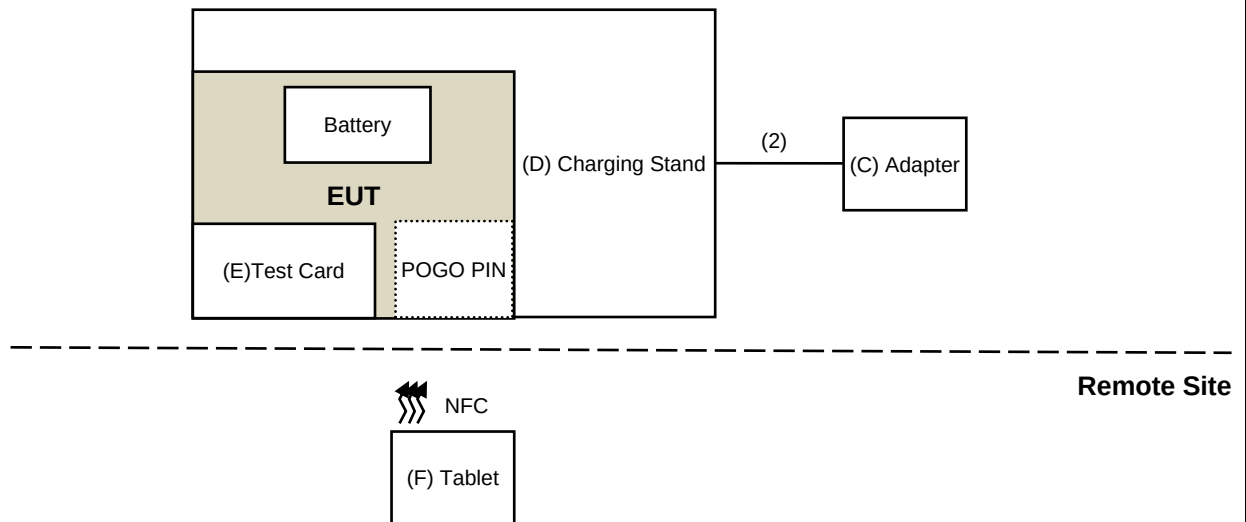
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| ID | Product        | Brand                        | Model No.                       | Serial No. | FCC ID | Remarks               |
|----|----------------|------------------------------|---------------------------------|------------|--------|-----------------------|
| C  | Adapter        | DEE VAN ENTERPRISE CO., LTD. | DSA-10PF15-05 FUS               | NA         | NA     | Supplied by applicant |
| D  | Charging Stand | CHASE                        | Chase Card Reader Charging Base | NA         | NA     | Supplied by applicant |
| E  | Test Card      | XAC                          | NA                              | NA         | NA     | Supplied by applicant |
| F  | Tablet         | SAMAUNG                      | SM-X700                         | NA         | NA     | Supplied by applicant |

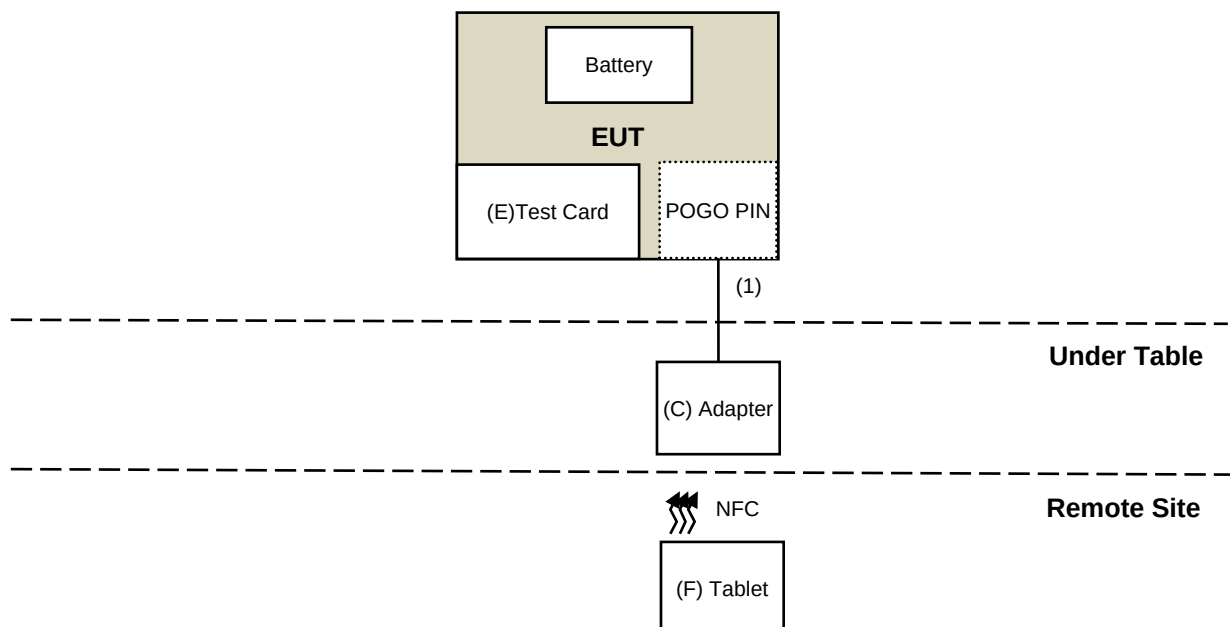
| ID | Descriptions     | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks               |
|----|------------------|------|------------|--------------------|--------------|-----------------------|
| 1  | POGO PIN Cable   | 1    | 2          | Yes                | 0            | Supplied by applicant |
| 2  | USB type C Cable | 1    | 1.2        | Yes                | 0            | Supplied by applicant |

### 3.3.1 Configuration of System under Test

For AC Power Conducted Emission test



For Radiated Emission test



### 3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C (15.225)**

**FCC Part 15, Subpart C (15.215)**

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

## 4 Test Types and Results

### 4.1 Radiated Emission Measurement

#### 4.1.1 Limits of Radiated Emission Measurement

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209 as below table:

| Frequencies (MHz) | Field Strength (microvolts/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                             |

#### Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
4. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

#### 4.1.2 Test Instruments

##### For Radiated Emission test:

| Description & Manufacturer                          | Model No.                | Serial No.  | Calibrated Date | Calibrated Until |
|-----------------------------------------------------|--------------------------|-------------|-----------------|------------------|
| Test Receiver<br>R&S                                | ESR3                     | 102528      | 2022/2/25       | 2023/2/24        |
| Spectrum Analyzer<br>Keysight                       | N9020B                   | MY60112410  | 2022/3/13       | 2023/3/12        |
| Software                                            | ADT_Radiated_V8.7<br>.08 | NA          | NA              | NA               |
| Boresight Antenna<br>Tower & Turn Table<br>Max-Full | MF-7802BS                | MF780208530 | NA              | NA               |
| Pre_Amplifier<br>Agilent                            | 8447D                    | 2944A10636  | 2022/3/19       | 2023/3/18        |
| LOOP ANTENNA<br>Electro-Metrics                     | EM-6879                  | 264         | 2022/3/18       | 2023/3/17        |
| RF Coaxial Cable<br>JYEBO                           | 5D-FB                    | LOOPCAB-001 | 2022/1/6        | 2023/1/5         |
| RF Coaxial Cable<br>JYEBO                           | 5D-FB                    | LOOPCAB-002 | 2022/1/6        | 2023/1/5         |
| Pre_Amplifier<br>EMCI                               | EMC330N                  | 980538      | 2022/4/25       | 2023/4/24        |
| Bilog Antenna<br>Schwarzbeck                        | VULB 9168                | 9168-0842   | 2022/10/24      | 2023/10/23       |
| RF Coaxial Cable<br>COMMATE/PEWC                    | 8D                       | 966-5-1     | 2022/4/25       | 2023/4/24        |
| RF Coaxial Cable<br>COMMATE/PEWC                    | 8D                       | 966-5-2     | 2022/4/25       | 2023/4/24        |
| RF Coaxial Cable<br>COMMATE/PEWC                    | 8D                       | 966-5-3     | 2022/4/25       | 2023/4/24        |
| Fixed attenuator<br>Mini-Circuits                   | UNAT-5+                  | PAD-ATT5-02 | 2022/1/10       | 2023/1/9         |

- Note: 1. The test was performed in 966 Chamber No. 5.  
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
 3. Tested Date: 2022/12/12 ~ 2022/12/26

**For other test items:**

| Description & Manufacturer                 | Model No.                     | Serial No.    | Calibrated Date | Calibrated Until |
|--------------------------------------------|-------------------------------|---------------|-----------------|------------------|
| Spectrum Analyzer Keysight                 | N9020B                        | MY60112409    | 2022/3/11       | 2023/3/10        |
| Attenuator WOKEN                           | MDCS18N-10                    | MDCS18N-10-01 | 2022/4/5        | 2023/4/4         |
| Software                                   | ADT_RF Test Software V6.6.5.4 | NA            | NA              | NA               |
| DC POWER SUPPLY Topward                    | 6603D                         | 795558        | NA              | NA               |
| Temperature & Humidity Chamber Giant Force | GTH-150-40-SP-AR              | MAA0812-008   | 2022/1/14       | 2023/1/13        |
| True RMS Clamp Meter Fluke                 | 325                           | 31130711WS    | 2022/6/9        | 2023/6/8         |

- Note: 1. The test was performed in Oven room 2.  
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
 3. Tested Date: 2022/12/21

#### 4.1.3 Test Procedures

##### **For Radiated Emission below 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak or Peak / Average Detect Function and Specified Bandwidth with Maximum Hold Mode.

##### **Note:**

1. The resolution bandwidth of test receiver/spectrum analyzer is 200Hz at frequency below 150kHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 9kHz at frequency 150kHz ~ 30MHz.

##### **For Radiated Emission above 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna 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.
- d. 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

##### **Note:**

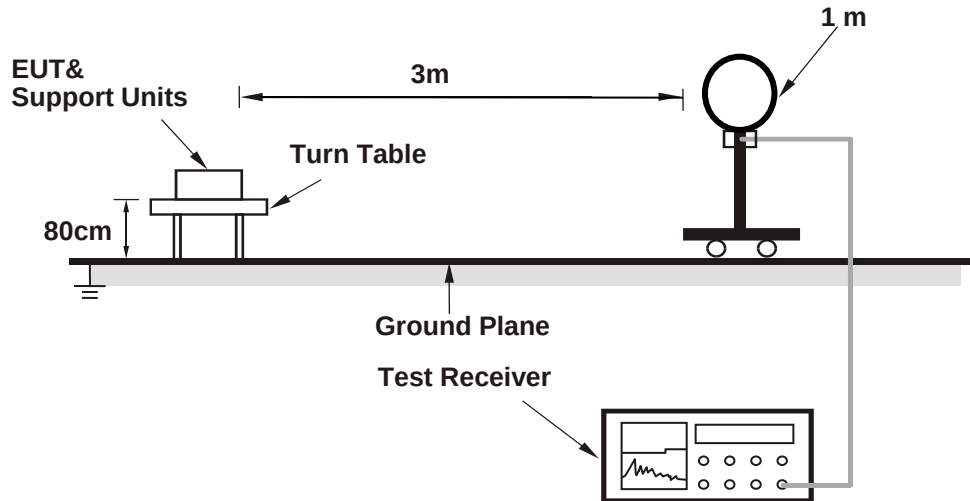
1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

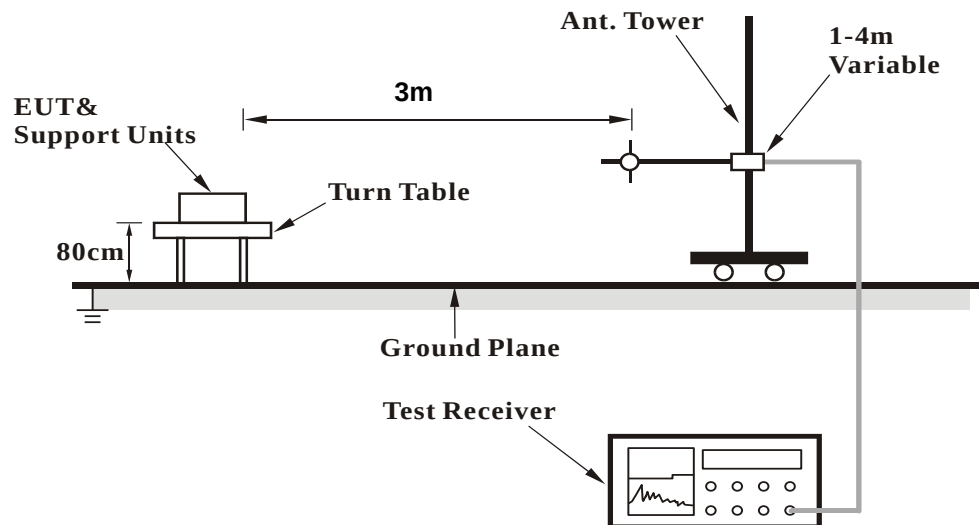
No deviation.

#### 4.1.5 Test Setup

##### For Radiated Emission below 30MHz



##### For Radiated Emission 30MHz to 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT Operating Conditions

- Placed the EUT on the testing table.
- Set the EUT under transmission condition continuously at specific channel frequency.

#### 4.1.7 Test Results

##### Type A

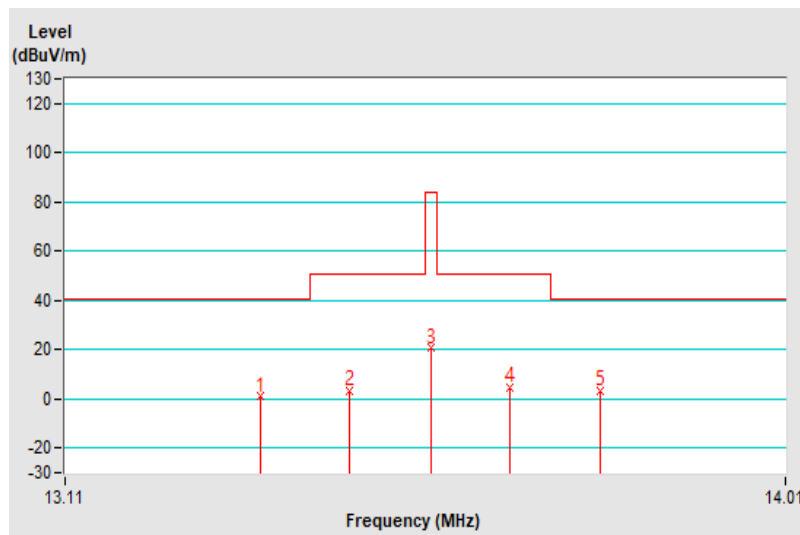
##### Below 30MHz Data:

|                 |                     |                               |                       |
|-----------------|---------------------|-------------------------------|-----------------------|
| Frequency Range | 13.11MHz ~ 14.01MHz | Detector Function & Bandwidth | Quasi-Peak (QP), 9kHz |
|-----------------|---------------------|-------------------------------|-----------------------|

| Antenna Polarity : Parallel |                 |                         |                |             |                    |                      |                  |                          |
|-----------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                          | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                           | 13.348          | 0.90 QP                 | 40.51          | -39.61      | 1.00               | 337                  | 43.61            | -42.71                   |
| 2                           | 13.459          | 3.36 QP                 | 50.47          | -47.11      | 1.00               | 337                  | 46.09            | -42.73                   |
| 3                           | *13.560         | 20.87 QP                | 84.00          | -63.13      | 1.00               | 337                  | 63.61            | -42.74                   |
| 4                           | 13.659          | 4.87 QP                 | 50.47          | -45.60      | 1.00               | 337                  | 47.62            | -42.75                   |
| 5                           | 13.772          | 3.47 QP                 | 40.51          | -37.04      | 1.00               | 337                  | 46.25            | -42.78                   |

##### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency.
6. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.  
Distance factor@3m =  $40 \cdot \log(3/30) = -40\text{dB}$

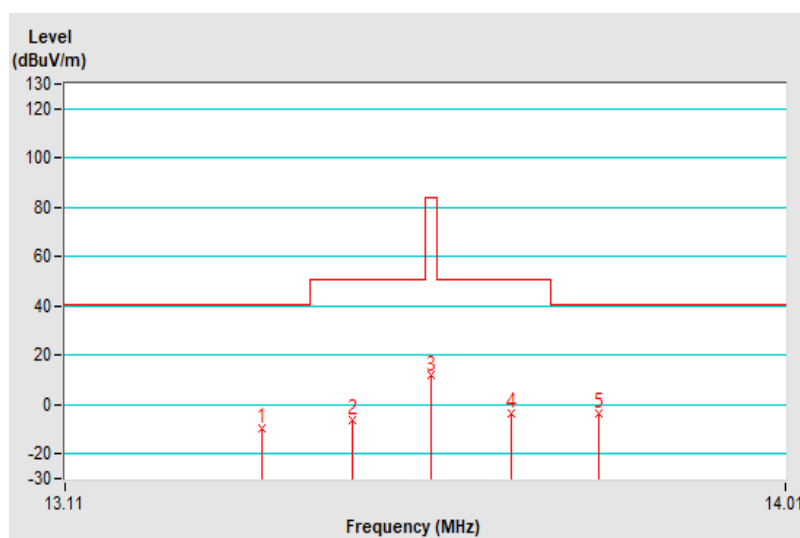


|                 |                     |                               |                       |
|-----------------|---------------------|-------------------------------|-----------------------|
| Frequency Range | 13.11MHz ~ 14.01MHz | Detector Function & Bandwidth | Quasi-Peak (QP), 9kHz |
|-----------------|---------------------|-------------------------------|-----------------------|

| Antenna Polarity : Perpendicular |                 |                         |                |             |                    |                      |                  |                          |
|----------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                               | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                | 13.350          | -9.50 QP                | 40.51          | -50.01      | 1.00               | 96                   | 33.21            | -42.71                   |
| 2                                | 13.461          | -6.08 QP                | 50.47          | -56.55      | 1.00               | 96                   | 36.65            | -42.73                   |
| 3                                | *13.560         | 12.11 QP                | 84.00          | -71.89      | 1.00               | 96                   | 54.85            | -42.74                   |
| 4                                | 13.660          | -3.25 QP                | 50.47          | -53.72      | 1.00               | 96                   | 39.50            | -42.75                   |
| 5                                | 13.771          | -3.44 QP                | 40.51          | -43.95      | 1.00               | 96                   | 39.34            | -42.78                   |

#### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency.
6. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.  
Distance factor@3m =  $40 \cdot \log(3/30) = -40\text{dB}$

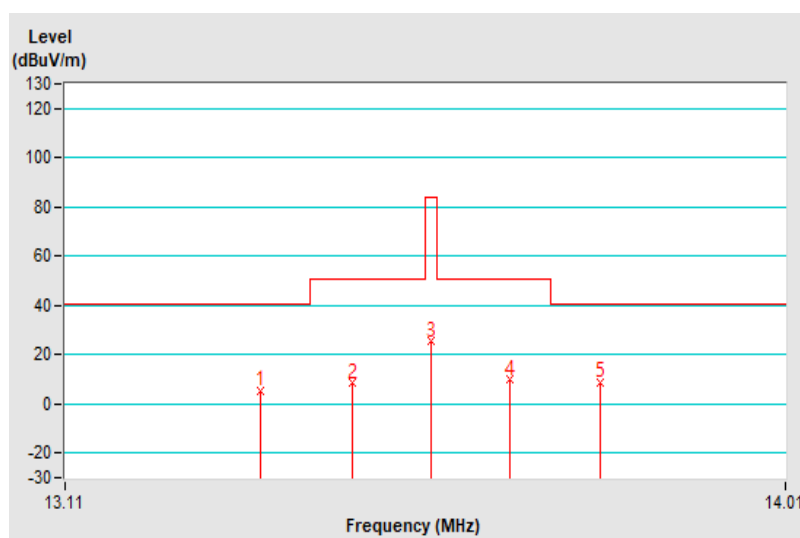


|                 |                     |                               |                       |
|-----------------|---------------------|-------------------------------|-----------------------|
| Frequency Range | 13.11MHz ~ 14.01MHz | Detector Function & Bandwidth | Quasi-Peak (QP), 9kHz |
|-----------------|---------------------|-------------------------------|-----------------------|

| Antenna Polarity : Ground-parallel |                 |                         |                |               |                    |                      |                  |                          |
|------------------------------------|-----------------|-------------------------|----------------|---------------|--------------------|----------------------|------------------|--------------------------|
| No                                 | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB)   | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                  | 13.349          | 5.59 QP                 | 40.51          | -34.92        | 1.00               | 133                  | 48.30            | -42.71                   |
| 2                                  | 13.461          | 8.65 QP                 | 50.47          | -41.82        | 1.00               | 133                  | 51.38            | -42.73                   |
| 3                                  | <b>*13.560</b>  | <b>25.66 QP</b>         | <b>84.00</b>   | <b>-58.34</b> | <b>1.00</b>        | <b>133</b>           | <b>68.40</b>     | <b>-42.74</b>            |
| 4                                  | 13.659          | 9.83 QP                 | 50.47          | -40.64        | 1.00               | 133                  | 52.58            | -42.75                   |
| 5                                  | 13.773          | 8.83 QP                 | 40.51          | -31.68        | 1.00               | 133                  | 51.61            | -42.78                   |

#### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency.
6. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.  
Distance factor@3m =  $40 \cdot \log(3/30) = -40\text{dB}$

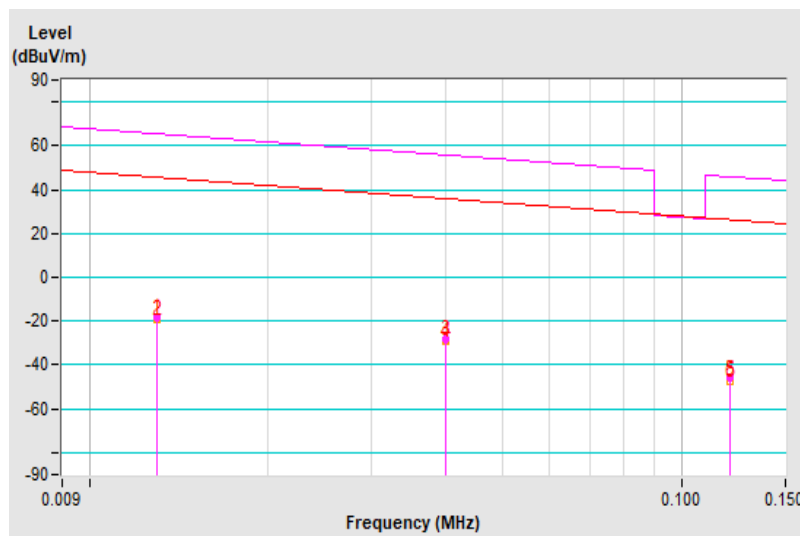


|                 |               |                               |                                 |
|-----------------|---------------|-------------------------------|---------------------------------|
| Frequency Range | 9kHz ~ 150kHz | Detector Function & Bandwidth | Peak (PK) / Average (AV), 200Hz |
|-----------------|---------------|-------------------------------|---------------------------------|

| Antenna Polarity : Parallel |                 |                         |                |             |                    |                      |                  |                          |
|-----------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                          | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                           | 0.013           | -18.12 PK               | 65.32          | -83.44      | 1.00               | 299                  | 27.50            | -45.62                   |
| 2                           | 0.013           | -18.88 AV               | 45.33          | -64.21      | 1.00               | 299                  | 26.74            | -45.62                   |
| 3                           | 0.040           | -28.20 PK               | 55.56          | -83.76      | 1.00               | 204                  | 26.26            | -54.46                   |
| 4                           | 0.040           | -29.01 AV               | 35.56          | -64.57      | 1.00               | 204                  | 25.45            | -54.46                   |
| 5                           | 0.121           | -45.86 PK               | 45.94          | -91.80      | 1.00               | 319                  | 18.75            | -64.61                   |
| 6                           | 0.121           | -46.93 AV               | 25.95          | -72.88      | 1.00               | 319                  | 17.68            | -64.61                   |

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for below 0.49 MHz is 3 m, extrapolate the measured field strength to a distance of 300 meters.  
Distance factor@3m =  $40 \cdot \log(3/300) = -80\text{dB}$

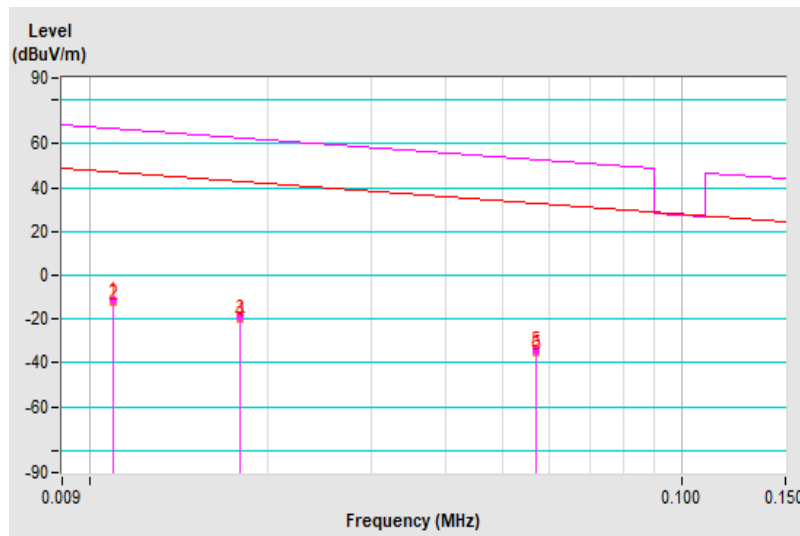


|                 |               |                               |                                 |
|-----------------|---------------|-------------------------------|---------------------------------|
| Frequency Range | 9kHz ~ 150kHz | Detector Function & Bandwidth | Peak (PK) / Average (AV), 200Hz |
|-----------------|---------------|-------------------------------|---------------------------------|

| Antenna Polarity : Perpendicular |                 |                         |                |             |                    |                      |                  |                          |
|----------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                               | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                | 0.011           | -11.30 PK               | 66.78          | -78.08      | 1.00               | 282                  | 33.53            | -44.83                   |
| 2                                | 0.011           | -12.34 AV               | 46.78          | -59.12      | 1.00               | 282                  | 32.49            | -44.83                   |
| 3                                | 0.018           | -19.15 PK               | 62.50          | -81.65      | 1.00               | 178                  | 28.45            | -47.60                   |
| 4                                | 0.018           | -19.93 AV               | 42.50          | -62.43      | 1.00               | 178                  | 27.67            | -47.60                   |
| 5                                | 0.057           | -34.27 PK               | 52.48          | -86.75      | 1.00               | 117                  | 23.73            | -58.00                   |
| 6                                | 0.057           | -35.37 AV               | 32.49          | -67.86      | 1.00               | 117                  | 22.63            | -58.00                   |

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for below 0.49 MHz is 3 m, extrapolate the measured field strength to a distance of 300 meters.  
Distance factor@3m =  $40 \cdot \log(3/300) = -80\text{dB}$

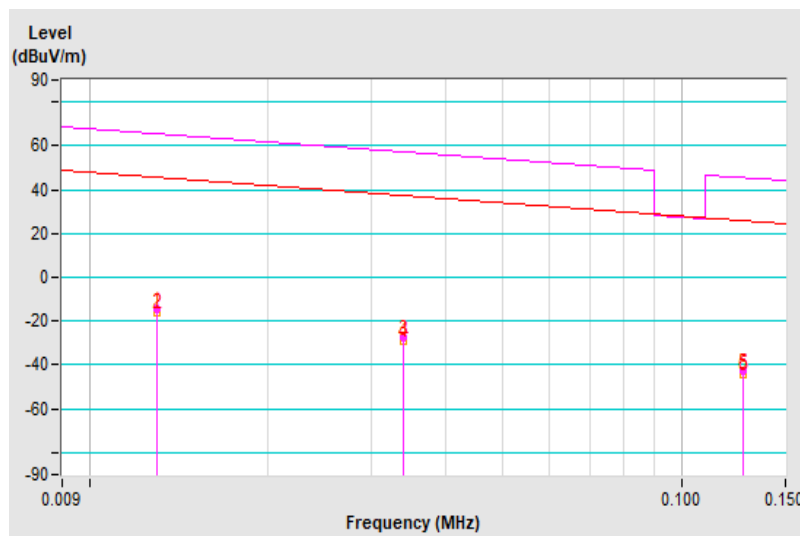


|                 |               |                               |                                 |
|-----------------|---------------|-------------------------------|---------------------------------|
| Frequency Range | 9kHz ~ 150kHz | Detector Function & Bandwidth | Peak (PK) / Average (AV), 200Hz |
|-----------------|---------------|-------------------------------|---------------------------------|

| Antenna Polarity : Ground-parallel |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                 | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                  | 0.013           | -14.66 PK               | 65.32          | -79.98      | 1.00               | 214                  | 30.96            | -45.62                   |
| 2                                  | 0.013           | -15.72 AV               | 45.33          | -61.05      | 1.00               | 214                  | 29.90            | -45.62                   |
| 3                                  | 0.034           | -27.72 PK               | 56.97          | -84.69      | 1.00               | 285                  | 25.20            | -52.92                   |
| 4                                  | 0.034           | -29.00 AV               | 36.97          | -65.97      | 1.00               | 285                  | 23.92            | -52.92                   |
| 5                                  | 0.127           | -43.00 PK               | 45.52          | -88.52      | 1.00               | 125                  | 21.84            | -64.84                   |
| 6                                  | 0.127           | -44.21 AV               | 25.53          | -69.74      | 1.00               | 125                  | 20.63            | -64.84                   |

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for below 0.49 MHz is 3 m, extrapolate the measured field strength to a distance of 300 meters.  
Distance factor@3m =  $40 \cdot \log(3/300) = -80\text{dB}$

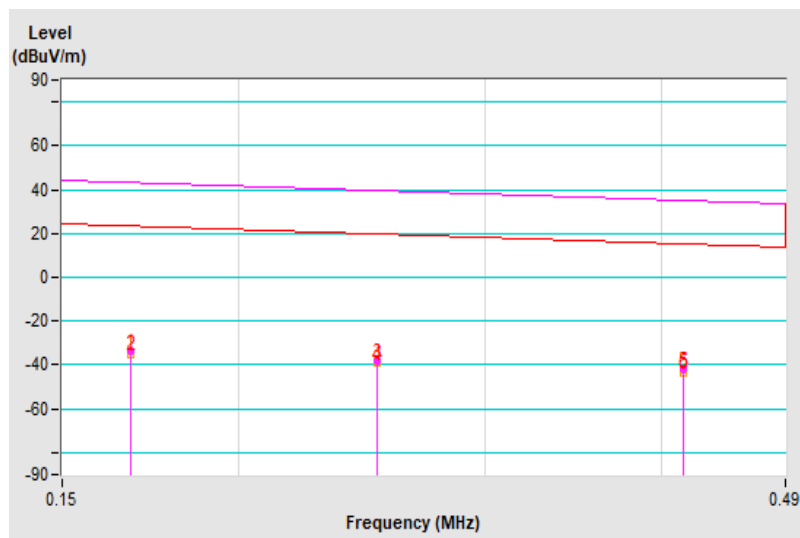


|                 |                 |                               |                                |
|-----------------|-----------------|-------------------------------|--------------------------------|
| Frequency Range | 150kHz ~ 490kHz | Detector Function & Bandwidth | Peak (PK) / Average (AV), 9kHz |
|-----------------|-----------------|-------------------------------|--------------------------------|

| Antenna Polarity : Parallel |                 |                         |                |             |                    |                      |                  |                          |
|-----------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                          | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                           | 0.168           | -33.70 PK               | 43.10          | -76.80      | 1.00               | 312                  | 32.74            | -66.44                   |
| 2                           | 0.168           | -34.74 AV               | 23.10          | -57.84      | 1.00               | 312                  | 31.70            | -66.44                   |
| 3                           | 0.251           | -38.29 PK               | 39.61          | -77.90      | 1.00               | 259                  | 31.50            | -69.79                   |
| 4                           | 0.251           | -39.20 AV               | 19.61          | -58.81      | 1.00               | 259                  | 30.59            | -69.79                   |
| 5                           | 0.415           | -42.25 PK               | 35.24          | -77.49      | 1.00               | 164                  | 31.54            | -73.79                   |
| 6                           | 0.415           | -43.13 AV               | 15.24          | -58.37      | 1.00               | 164                  | 30.66            | -73.79                   |

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for below 0.49 MHz is 3 m, extrapolate the measured field strength to a distance of 300 meters.  
Distance factor@3m =  $40 \cdot \log(3/300) = -80\text{dB}$

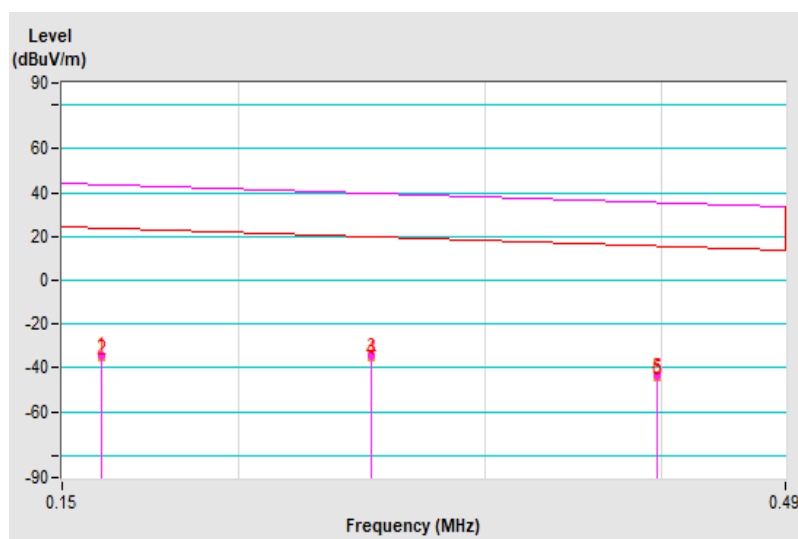


|                 |                 |                               |                                |
|-----------------|-----------------|-------------------------------|--------------------------------|
| Frequency Range | 150kHz ~ 490kHz | Detector Function & Bandwidth | Peak (PK) / Average (AV), 9kHz |
|-----------------|-----------------|-------------------------------|--------------------------------|

| Antenna Polarity : Perpendicular |                 |                         |                |             |                    |                      |                  |                          |
|----------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                               | Frequency (MHz) | Emission Level (dBUV/m) | Limit (dBUV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBUV) | Correction Factor (dB/m) |
| 1                                | 0.160           | -34.23 PK               | 43.52          | -77.75      | 1.00               | 118                  | 31.90            | -66.13                   |
| 2                                | 0.160           | -35.16 AV               | 23.52          | -58.68      | 1.00               | 118                  | 30.97            | -66.13                   |
| 3                                | 0.249           | -34.47 PK               | 39.68          | -74.15      | 1.00               | 274                  | 35.23            | -69.70                   |
| 4                                | 0.249           | -35.40 AV               | 19.68          | -55.08      | 1.00               | 274                  | 34.30            | -69.70                   |
| 5                                | 0.397           | -43.65 PK               | 35.63          | -79.28      | 1.00               | 234                  | 29.80            | -73.45                   |
| 6                                | 0.397           | -44.52 AV               | 15.63          | -60.15      | 1.00               | 234                  | 28.93            | -73.45                   |

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for below 0.49 MHz is 3 m, extrapolate the measured field strength to a distance of 300 meters.  
Distance factor@3m =  $40 \cdot \log(3/300) = -80\text{dB}$

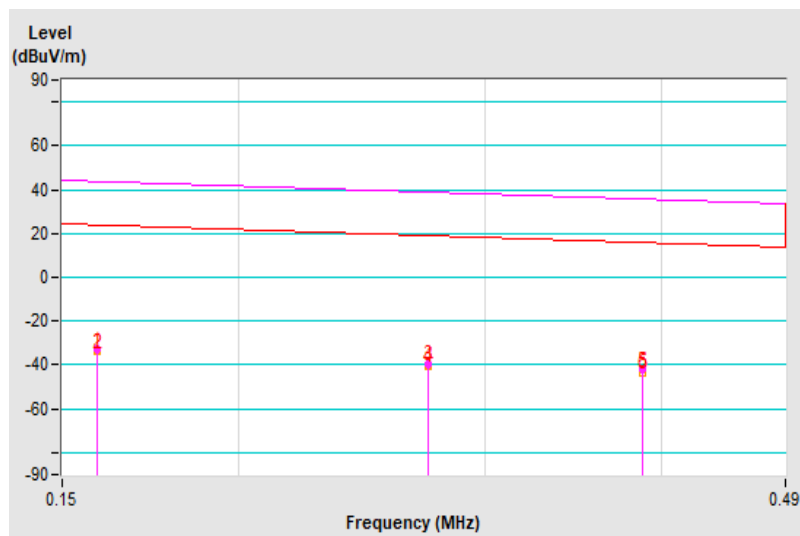


|                 |                 |                               |                                |
|-----------------|-----------------|-------------------------------|--------------------------------|
| Frequency Range | 150kHz ~ 490kHz | Detector Function & Bandwidth | Peak (PK) / Average (AV), 9kHz |
|-----------------|-----------------|-------------------------------|--------------------------------|

| Antenna Polarity : Ground-parallel |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                 | Frequency (MHz) | Emission Level (dBUV/m) | Limit (dBUV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBUV) | Correction Factor (dB/m) |
| 1                                  | 0.159           | -33.12 PK               | 43.57          | -76.69      | 1.00               | 267                  | 32.97            | -66.09                   |
| 2                                  | 0.159           | -33.93 AV               | 23.57          | -57.50      | 1.00               | 267                  | 32.16            | -66.09                   |
| 3                                  | 0.273           | -39.56 PK               | 38.88          | -78.44      | 1.00               | 307                  | 31.12            | -70.68                   |
| 4                                  | 0.273           | -40.30 AV               | 18.88          | -59.18      | 1.00               | 307                  | 30.38            | -70.68                   |
| 5                                  | 0.388           | -42.24 PK               | 35.83          | -78.07      | 1.00               | 260                  | 31.06            | -73.30                   |
| 6                                  | 0.388           | -43.27 AV               | 15.83          | -59.10      | 1.00               | 260                  | 30.03            | -73.30                   |

**Remarks:**

1. Emission Level(dBUV/m) = Raw Value(dBUV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for below 0.49 MHz is 3 m, extrapolate the measured field strength to a distance of 300 meters.  
Distance factor@3m =  $40 \cdot \log(3/300) = -80\text{dB}$

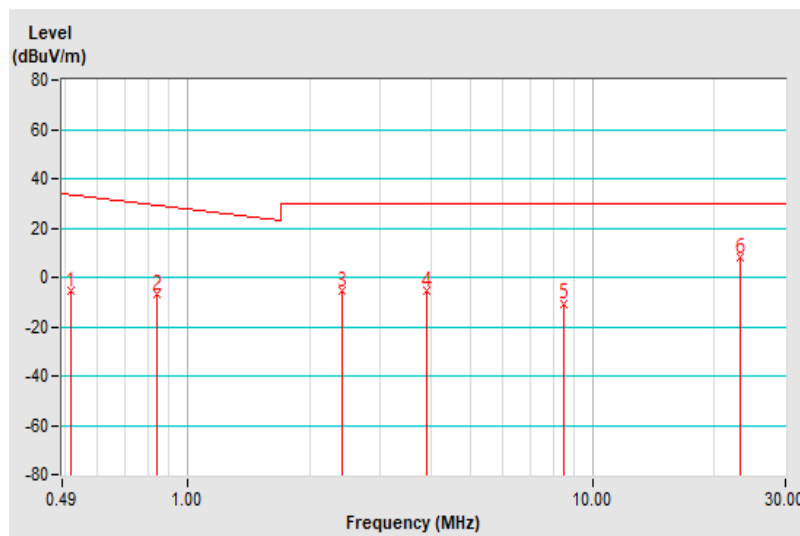


|                 |                |                               |                       |
|-----------------|----------------|-------------------------------|-----------------------|
| Frequency Range | 490kHz ~ 30MHz | Detector Function & Bandwidth | Quasi-Peak (QP), 9kHz |
|-----------------|----------------|-------------------------------|-----------------------|

| Antenna Polarity : Parallel |                 |                         |                |             |                    |                      |                  |                          |
|-----------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                          | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                           | 0.514           | -5.49 QP                | 33.38          | -38.87      | 1.00               | 171                  | 29.98            | -35.47                   |
| 2                           | 0.837           | -6.80 QP                | 29.15          | -35.95      | 1.00               | 202                  | 31.10            | -37.90                   |
| 3                           | 2.417           | -5.59 QP                | 29.54          | -35.13      | 1.00               | 115                  | 36.64            | -42.23                   |
| 4                           | 3.907           | -5.59 QP                | 29.54          | -35.13      | 1.00               | 212                  | 38.15            | -43.74                   |
| 5                           | 8.487           | -10.70 QP               | 29.54          | -40.24      | 1.00               | 98                   | 32.04            | -42.74                   |
| 6                           | 23.128          | 8.10 QP                 | 29.54          | -21.44      | 1.00               | 309                  | 51.16            | -43.06                   |

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.  
Distance factor@3m =  $40 \cdot \log(3/30) = -40\text{dB}$

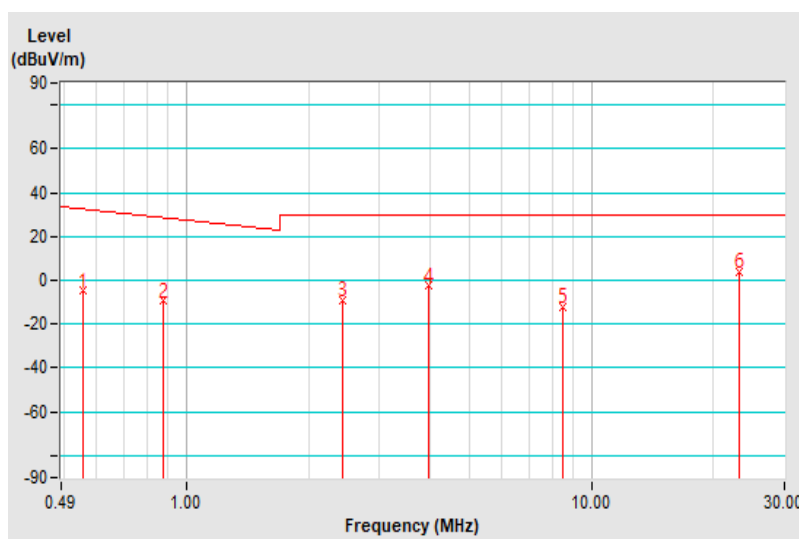


|                 |                |                               |                       |
|-----------------|----------------|-------------------------------|-----------------------|
| Frequency Range | 490kHz ~ 30MHz | Detector Function & Bandwidth | Quasi-Peak (QP), 9kHz |
|-----------------|----------------|-------------------------------|-----------------------|

| Antenna Polarity : Perpendicular |                 |                         |                |             |                    |                      |                  |                          |
|----------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                               | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                | 0.557           | -4.94 QP                | 32.69          | -37.63      | 1.00               | 211                  | 30.86            | -35.80                   |
| 2                                | 0.876           | -9.39 QP                | 28.75          | -38.14      | 1.00               | 179                  | 28.81            | -38.20                   |
| 3                                | 2.423           | -8.98 QP                | 29.54          | -38.52      | 1.00               | 301                  | 33.26            | -42.24                   |
| 4                                | 3.964           | -2.46 QP                | 29.54          | -32.00      | 1.00               | 111                  | 41.29            | -43.75                   |
| 5                                | 8.472           | -12.24 QP               | 29.54          | -41.78      | 1.00               | 137                  | 30.51            | -42.75                   |
| 6                                | 23.128          | 3.90 QP                 | 29.54          | -25.64      | 1.00               | 158                  | 46.96            | -43.06                   |

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.  
Distance factor@3m =  $40 \cdot \log(3/30) = -40\text{dB}$

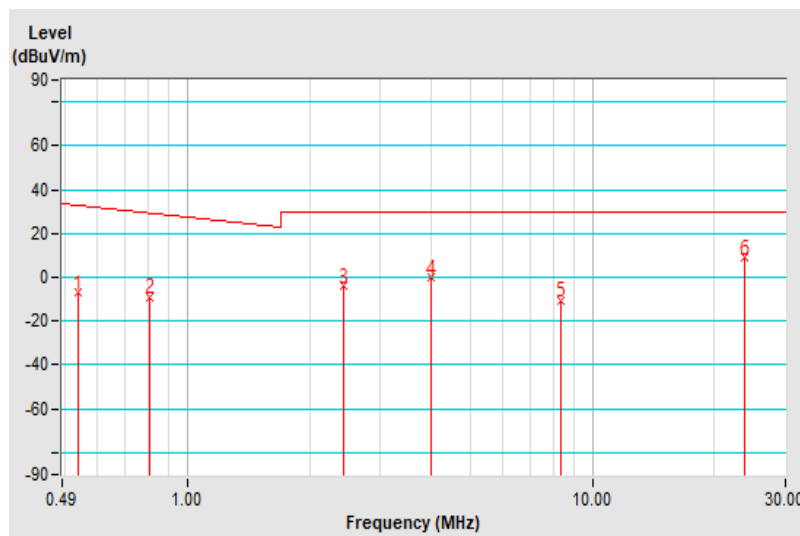


|                 |                |                               |                       |
|-----------------|----------------|-------------------------------|-----------------------|
| Frequency Range | 490kHz ~ 30MHz | Detector Function & Bandwidth | Quasi-Peak (QP), 9kHz |
|-----------------|----------------|-------------------------------|-----------------------|

| Antenna Polarity : Ground-parallel |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                 | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                  | 0.536           | -7.19 QP                | 33.02          | -40.21      | 1.00               | 334                  | 28.45            | -35.64                   |
| 2                                  | 0.809           | -9.11 QP                | 29.44          | -38.55      | 1.00               | 128                  | 28.58            | -37.69                   |
| 3                                  | 2.424           | -3.99 QP                | 29.54          | -33.53      | 1.00               | 123                  | 38.25            | -42.24                   |
| 4                                  | 3.991           | -0.20 QP                | 29.54          | -29.74      | 1.00               | 121                  | 43.56            | -43.76                   |
| 5                                  | 8.378           | -10.50 QP               | 29.54          | -40.04      | 1.00               | 254                  | 32.27            | -42.77                   |
| 6                                  | 23.738          | 8.92 QP                 | 29.54          | -20.62      | 1.00               | 101                  | 51.86            | -42.94                   |

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.  
Distance factor@3m =  $40 \cdot \log(3/30) = -40\text{dB}$



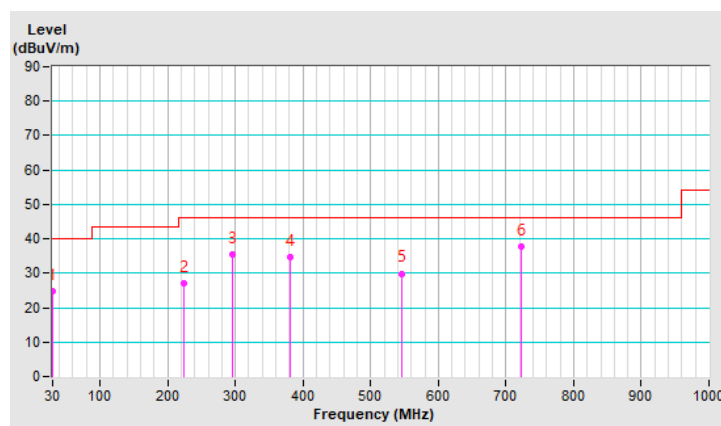
# Above 30MHz Data:

|                 |              |                   |                         |
|-----------------|--------------|-------------------|-------------------------|
| Frequency Range | 30MHz ~ 1GHz | Detector Function | Quasi-Peak (QP), 120kHz |
|-----------------|--------------|-------------------|-------------------------|

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 30.44           | 24.9 QP                 | 40.0           | -15.1       | 1.00 H             | 167                  | 38.9             | -14.0                    |
| 2                                                    | 224.02          | 27.0 QP                 | 46.0           | -19.0       | 1.50 H             | 16                   | 42.9             | -15.9                    |
| 3                                                    | 296.72          | 35.6 QP                 | 46.0           | -10.4       | 1.00 H             | 111                  | 48.0             | -12.4                    |
| 4                                                    | 380.89          | 34.7 QP                 | 46.0           | -11.3       | 1.00 H             | 95                   | 45.1             | -10.4                    |
| 5                                                    | 545.97          | 29.9 QP                 | 46.0           | -16.1       | 1.50 H             | 240                  | 36.7             | -6.8                     |
| 6                                                    | 723.14          | 37.6 QP                 | 46.0           | -8.4        | 2.00 H             | 352                  | 41.1             | -3.5                     |

## Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.

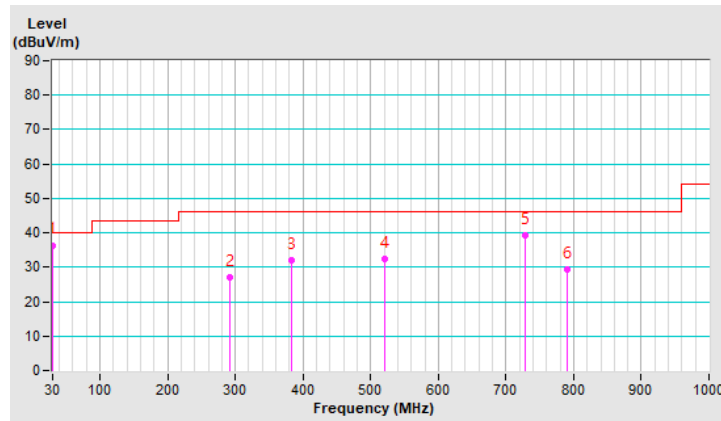


|                 |              |                   |                         |
|-----------------|--------------|-------------------|-------------------------|
| Frequency Range | 30MHz ~ 1GHz | Detector Function | Quasi-Peak (QP), 120kHz |
|-----------------|--------------|-------------------|-------------------------|

| Antenna Polarity & Test Distance : Vertical at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|----------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                 | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                  | 30.71           | 36.4 QP                 | 40.0           | -3.6        | 1.50 V             | 60                   | 50.5             | -14.1                    |
| 2                                                  | 292.80          | 27.2 QP                 | 46.0           | -18.8       | 3.00 V             | 214                  | 39.6             | -12.4                    |
| 3                                                  | 382.64          | 31.9 QP                 | 46.0           | -14.1       | 1.50 V             | 85                   | 42.2             | -10.3                    |
| 4                                                  | 520.91          | 32.5 QP                 | 46.0           | -13.5       | 1.00 V             | 249                  | 39.6             | -7.1                     |
| 5                                                  | 729.26          | 39.2 QP                 | 46.0           | -6.8        | 1.50 V             | 265                  | 42.5             | -3.3                     |
| 6                                                  | 789.79          | 29.5 QP                 | 46.0           | -16.5       | 1.00 V             | 138                  | 31.9             | -2.4                     |

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.



## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

| Frequency (MHz) | Conducted Limit (dBuV) |         |
|-----------------|------------------------|---------|
|                 | Quasi-peak             | Average |
| 0.15 - 0.5      | 66 - 56                | 56 - 46 |
| 0.50 - 5.0      | 56                     | 46      |
| 5.0 - 30.0      | 60                     | 50      |

- Note: 1. The lower limit shall apply at the transition frequencies.  
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.  
 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### 4.2.2 Test Instruments

| Description & Manufacturer    | Model No.           | Serial No. | Calibrated Date | Calibrated Until |
|-------------------------------|---------------------|------------|-----------------|------------------|
| TEST RECEIVER R&S             | ESCS 30             | 847124/029 | 2022/10/14      | 2023/10/13       |
| LISN R&S                      | ESH3-Z5             | 848773/004 | 2022/10/18      | 2023/10/17       |
| 50 ohm terminal resistance NA | NA                  | EMC-01     | 2022/9/27       | 2023/9/26        |
| RF Coaxial Cable JYEBO        | 5D-FB               | COCCAB-001 | 2022/8/24       | 2023/8/23        |
| Fixed attenuator STI          | STI02-2200-10       | 005        | 2022/8/24       | 2023/8/23        |
| Software BVADT                | BVADT_Cond_V7.3.7.4 | NA         | NA              | NA               |

- Note: 1. The test was performed in Conduction 1.  
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
 3. Tested Date: 2022/12/26

#### 4.2.3 Test Procedures

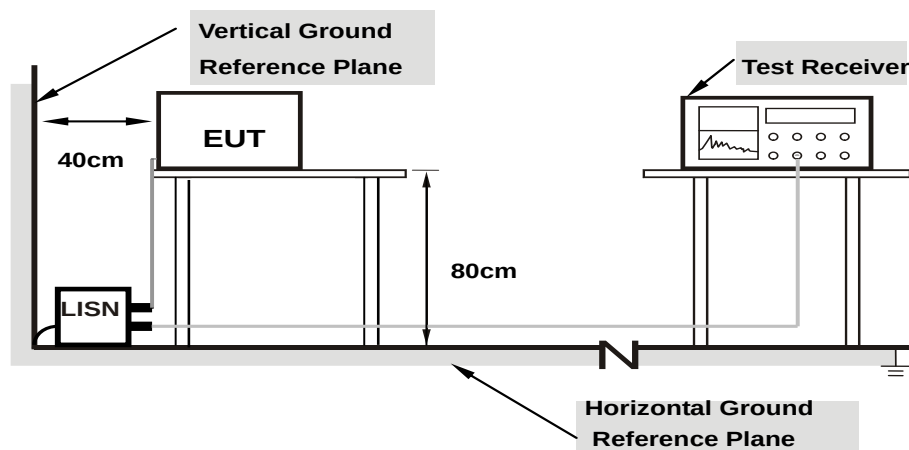
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**Note:** The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

#### 4.2.4 Deviation from Test Standard

No deviation.

#### 4.2.5 Test Setup



**Note:** 1.Support units were connected to second LISN.  
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.2.6 EUT Operating Conditions

Same as 4.1.6.

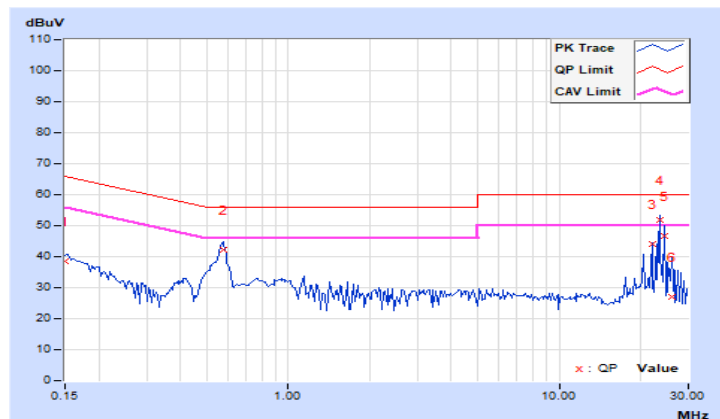
#### 4.2.7 Test Results

|                        |                |                                                     |                                      |
|------------------------|----------------|-----------------------------------------------------|--------------------------------------|
| <b>Frequency Range</b> | 150kHz ~ 30MHz | <b>Detector Function &amp; Resolution Bandwidth</b> | Quasi-Peak (QP) / Average (AV), 9kHz |
|------------------------|----------------|-----------------------------------------------------|--------------------------------------|

| Phase Of Power : Line (L) |                 |                        |                      |       |                       |       |              |       |             |        |
|---------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No                        | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |       | Emission Level (dBuV) |       | Limit (dBuV) |       | Margin (dB) |        |
|                           |                 |                        | Q.P.                 | AV.   | Q.P.                  | AV.   | Q.P.         | AV.   | Q.P.        | AV.    |
| 1                         | 0.15000         | 9.95                   | 28.47                | 15.77 | 38.42                 | 25.72 | 66.00        | 56.00 | -27.58      | -30.28 |
| 2                         | 0.57578         | 9.97                   | 32.31                | 26.46 | 42.28                 | 36.43 | 56.00        | 46.00 | -13.72      | -9.57  |
| 3                         | 22.09766        | 11.24                  | 32.99                | 21.76 | 44.23                 | 33.00 | 60.00        | 50.00 | -15.77      | -17.00 |
| 4                         | 23.63281        | 11.26                  | 40.62                | 32.91 | 51.88                 | 44.17 | 60.00        | 50.00 | -8.12       | -5.83  |
| 5                         | 24.37891        | 11.27                  | 35.43                | 25.56 | 46.70                 | 36.83 | 60.00        | 50.00 | -13.30      | -13.17 |
| 6                         | 26.01953        | 11.30                  | 15.62                | 1.94  | 26.92                 | 13.24 | 60.00        | 50.00 | -33.08      | -36.76 |

#### Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

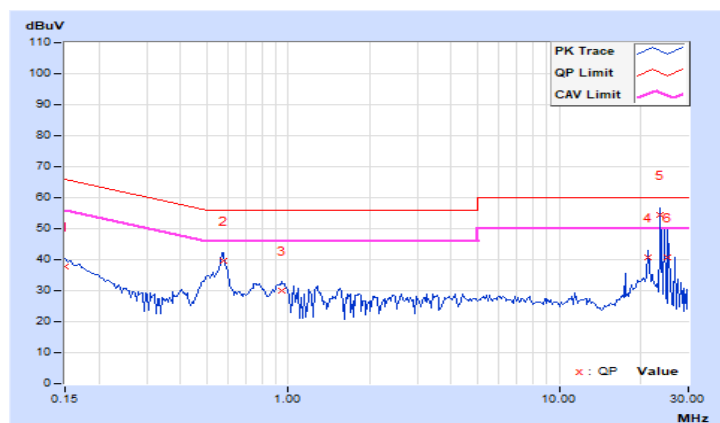


|                 |                |                                          |                                      |
|-----------------|----------------|------------------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
|-----------------|----------------|------------------------------------------|--------------------------------------|

| Phase Of Power : Neutral (N) |                 |                        |                      |       |                       |       |              |       |             |        |
|------------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No                           | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |       | Emission Level (dBuV) |       | Limit (dBuV) |       | Margin (dB) |        |
|                              |                 |                        | Q.P.                 | AV.   | Q.P.                  | AV.   | Q.P.         | AV.   | Q.P.        | AV.    |
| 1                            | 0.15000         | 9.95                   | 27.87                | 14.29 | 37.82                 | 24.24 | 66.00        | 56.00 | -28.18      | -31.76 |
| 2                            | 0.57969         | 9.97                   | 29.74                | 20.72 | 39.71                 | 30.69 | 56.00        | 46.00 | -16.29      | -15.31 |
| 3                            | 0.94297         | 10.00                  | 19.90                | 10.82 | 29.90                 | 20.82 | 56.00        | 46.00 | -26.10      | -25.18 |
| 4                            | 21.33203        | 10.99                  | 29.75                | 14.39 | 40.74                 | 25.38 | 60.00        | 50.00 | -19.26      | -24.62 |
| 5                            | 23.62172        | 11.00                  | 43.40                | 35.13 | 54.40                 | 46.13 | 60.00        | 50.00 | -5.60       | -3.87  |
| 6                            | 25.13281        | 11.01                  | 29.83                | 11.87 | 40.84                 | 22.88 | 60.00        | 50.00 | -19.16      | -27.12 |

**Remarks:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

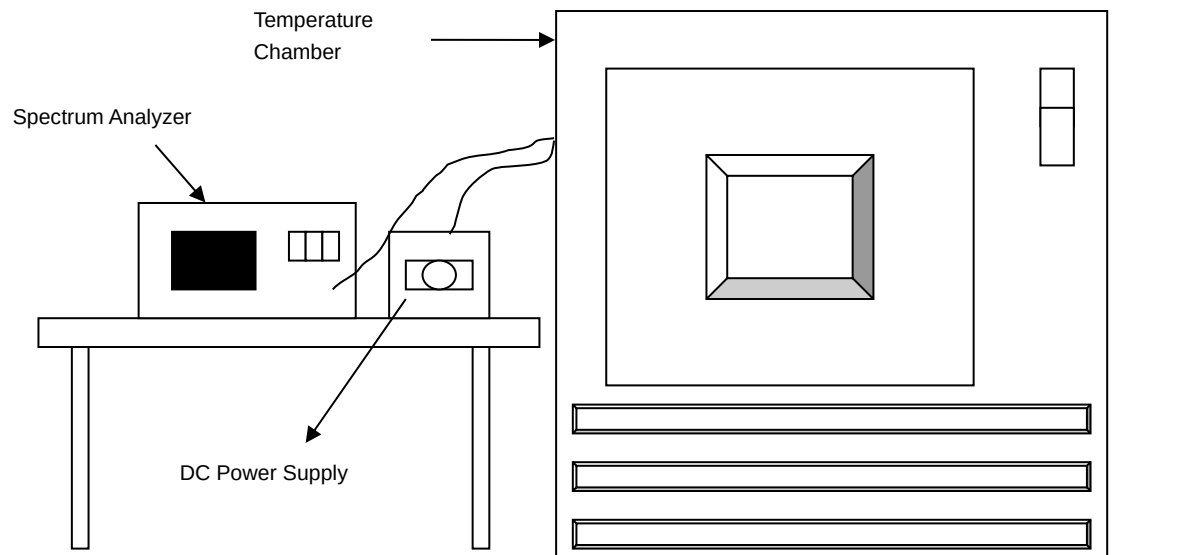


### 4.3 Frequency Stability

#### 4.3.1 Limits of Frequency Stability Measurement

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from  $85\%$  to  $115\%$  of the rated supply voltage at a temperature of  $20$  degrees C.

#### 4.3.2 Test Setup



#### 4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 Test Procedure

- The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.
- Repeat step (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed.
- The test chamber was allowed to stabilize at  $+20$  degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from  $85\%$  to  $115\%$  and the frequency record.

#### 4.3.5 Deviation from Test Standard

No deviation.

#### 4.3.6 EUT Operating Conditions

Set the EUT transmit at un-modulation mode to test frequency stability.

#### 4.3.7 Test Result

| Frequency Stability Versus Temp. |                          |                                |                           |                                |                           |                                |                           |                                |                           |
|----------------------------------|--------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|
| Operating Frequency: 13.56 MHz   |                          |                                |                           |                                |                           |                                |                           |                                |                           |
| TEMP.<br>(°C)                    | Power<br>Supply<br>(Vdc) | 0 Minute                       |                           | 2 Minutes                      |                           | 5 Minutes                      |                           | 10 Minutes                     |                           |
|                                  |                          | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) |
| 50                               | 3.8                      | 13.55996                       | -0.00029                  | 13.55996                       | -0.00029                  | 13.55996                       | -0.00029                  | 13.55996                       | -0.00029                  |
| 40                               | 3.8                      | 13.56005                       | 0.00037                   | 13.56006                       | 0.00044                   | 13.56006                       | 0.00044                   | 13.56006                       | 0.00044                   |
| 30                               | 3.8                      | 13.56005                       | 0.00037                   | 13.56005                       | 0.00037                   | 13.56006                       | 0.00044                   | 13.56006                       | 0.00044                   |
| 20                               | 3.8                      | 13.55995                       | -0.00037                  | 13.55996                       | -0.00029                  | 13.55996                       | -0.00029                  | 13.55996                       | -0.00029                  |
| 10                               | 3.8                      | 13.56007                       | 0.00052                   | 13.56007                       | 0.00052                   | 13.56007                       | 0.00052                   | 13.56007                       | 0.00052                   |
| 0                                | 3.8                      | 13.55998                       | -0.00015                  | 13.55997                       | -0.00022                  | 13.56002                       | 0.00015                   | 13.56006                       | 0.00044                   |

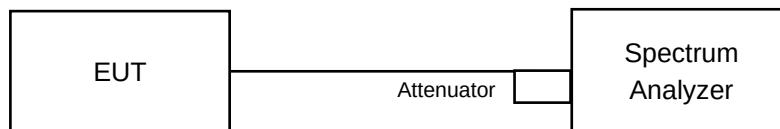
| Frequency Stability Versus Voltage |                          |                                |                           |                                |                           |                                |                           |                                |                           |
|------------------------------------|--------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|
| Operating Frequency: 13.56 MHz     |                          |                                |                           |                                |                           |                                |                           |                                |                           |
| TEMP.<br>(°C)                      | Power<br>Supply<br>(Vdc) | 0 Minute                       |                           | 2 Minutes                      |                           | 5 Minutes                      |                           | 10 Minutes                     |                           |
|                                    |                          | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(%) |
| 20                                 | 4.37                     | 13.55995                       | -0.00037                  | 13.55996                       | -0.00029                  | 13.55996                       | -0.00029                  | 13.55996                       | -0.00029                  |
|                                    | 3.8                      | 13.55995                       | -0.00037                  | 13.55996                       | -0.00029                  | 13.55996                       | -0.00029                  | 13.55996                       | -0.00029                  |
|                                    | 3.23                     | 13.55995                       | -0.00037                  | 13.55996                       | -0.00029                  | 13.55996                       | -0.00029                  | 13.55996                       | -0.00029                  |

#### 4.4 20dB Bandwidth

##### 4.4.1 Limits of 20dB BANDWIDTH Measurement

The 20dB bandwidth shall be specified in operating frequency band.

##### 4.4.2 Test Setup



##### 4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

##### 4.4.4 Test Procedures

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 10Hz RBW and 30Hz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

##### 4.4.5 Deviation from Test Standard

No deviation.

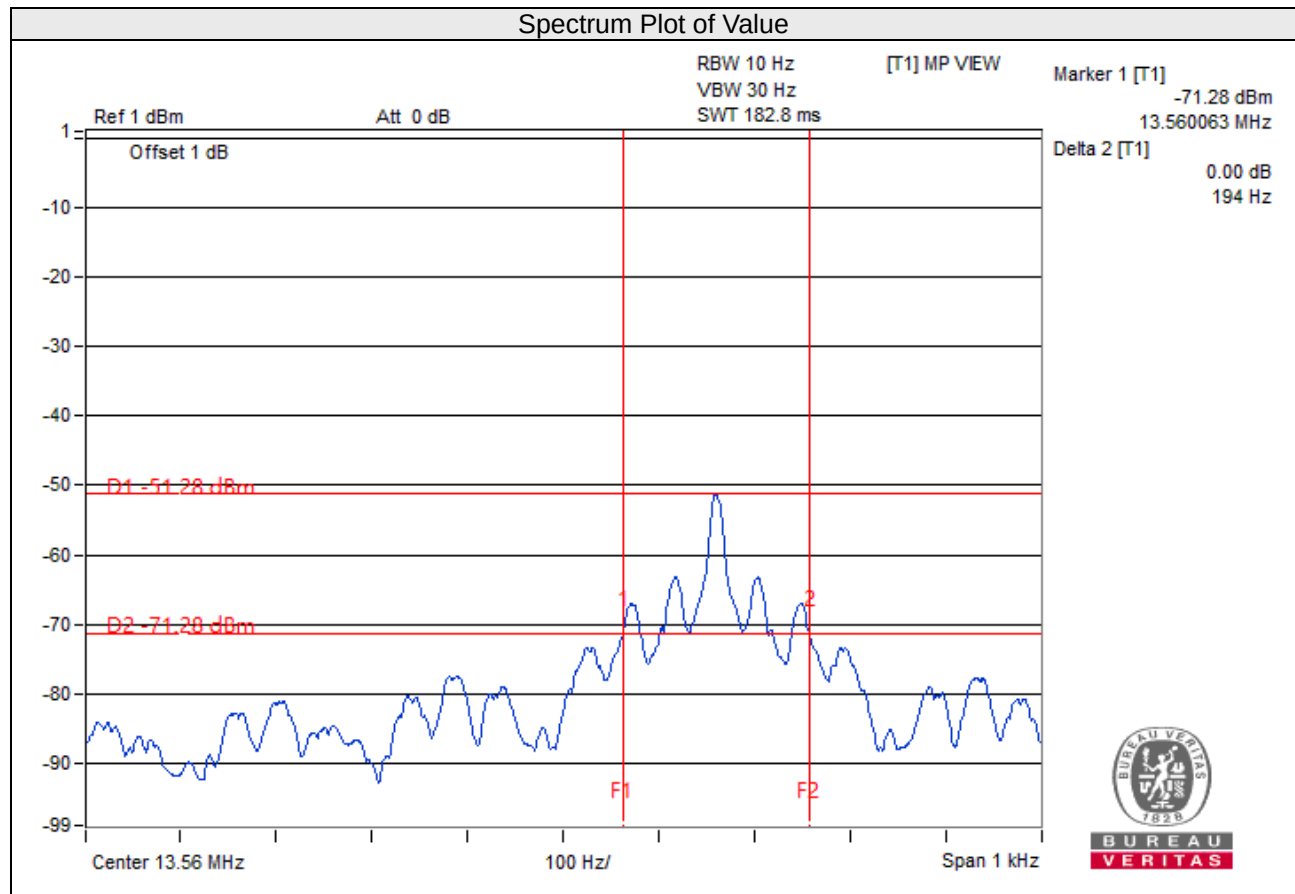
##### 4.4.6 EUT Operating Conditions

Same as Item 4.1.6.

#### 4.4.7 Test Results

##### Type A

| Operating Frequency Band (MHz) | 20dB Bandwidth (MHz) | 20dB Point (MHz) |           | Pass / Fail |
|--------------------------------|----------------------|------------------|-----------|-------------|
|                                |                      | Lowest           | Highest   |             |
| 13.11 – 14.01                  | 0.000194             | 13.560063        | 13.560257 | Pass        |



## 5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

## Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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The address and road map of all our labs can be found in our web site also.

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