

## FCC Test Report (NFC)

**Report No.:** RF200601E06-4

**FCC ID:** MQT-AT100R3

**Test Model:** xCL\_AT-100-R3-18U

**Received Date:** June 01, 2020

**Test Date:** July 05 to 15, 2020

**Issued Date:** Oct. 16, 2020

**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   |
|---------------|-------------------|---------------|
| RF200601E06-4 | Original release. | Oct. 16, 2020 |

## 1 Certificate of Conformity

**Product:** Terminal

**Brand:** XAC

**Test Model:** xCL\_AT-100-R3-18U

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** XAC AUTOMATION CORP.

**Test Date:** July 05 to 15, 2020

**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 :**



**Date:** Oct. 16, 2020

Joyce Kuo / Specialist

**Approved by :**



**Date:** Oct. 16, 2020

Clark Lin / Technical 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.<br>Minimum passing margin is -20.47dB at 16.61719MHz. |
| 15.225 (a)                                             | The field strength of any emissions within the band 13.553-13.567 MHz                        | PASS   | Meet the requirement of limit.<br>Minimum passing margin is -5.9dB at 48.99MHz.      |
| 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.<br>Minimum passing margin is -7.6dB at 50.05MHz.      |
| 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   | Antenna connector is i-pex(MHF) not a standard connector.                            |

### 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) ( $\pm$ ) |
|------------------------------------|----------------|--------------------------------------|
| Conducted Emissions at mains ports | 150kHz ~ 30MHz | 1.9 dB                               |
| Conducted emissions                | -              | 2.5 dB                               |
| Radiated Emissions up to 1 GHz     | 9kHz ~ 30MHz   | 3.1 dB                               |
|                                    | 30MHz ~ 1GHz   | 5.4 dB                               |

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT (NFC)

|                     |                     |
|---------------------|---------------------|
| Product             | Terminal            |
| Brand               | XAC                 |
| Test Model          | xCL_AT-100-R3-18U   |
| Status of EUT       | ENGINEERING SAMPLE  |
| Power Supply Rating | Refer to note       |
| 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       |
| Accessory Device    | Battery x1 (Option) |
| Data Cable Supplied | NA                  |

Note:

1. The EUT has three radios as following table:

| Radio 1                         | Radio 2           | Radio 3 |
|---------------------------------|-------------------|---------|
| WLAN(2.4GHz + 5GHz) + Bluetooth | WWAN(LTE + WCDMA) | NFC     |

2. Simultaneously transmission condition.

| Condition | Technology  |           |
|-----------|-------------|-----------|
| 1         | WWAN        | NFC       |
| 2         | WWAN        | Bluetooth |
| 3         | WLAN 2.4GHz | NFC       |
| 4         | WLAN 5GHz   | NFC       |
| 5         | Bluetooth   | NFC       |

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

3. The EUT must be supplied power adapter and battery as following table:

| Adapter (Only test not for sale)                     |                 |                                                            |
|------------------------------------------------------|-----------------|------------------------------------------------------------|
| Brand                                                | Model           | Specification                                              |
| MASS POWER                                           | NBS10B050200VUU | AC Input: 100-240Vac, 0.3A, 50-60Hz<br>DC Output: 5Vdc, 2A |
| Battery (Option)                                     |                 |                                                            |
| Brand                                                | Model           | Specification                                              |
| Shenzhen Rishengzhi Electronics Technology Co., Ltd. | J625            | 3.7V, 3000mAh, 11.1Wh                                      |

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

| Antenna Set | RF Chain NO. | Brand | Model        | Antenna Net Gain(dBi) | Frequency range               | Antenna Type | Connector Type |
|-------------|--------------|-------|--------------|-----------------------|-------------------------------|--------------|----------------|
| NFC         | Main         | XAC   | RTOS         | 13                    | 13.56MHz                      | wire         | None           |
| Wi-Fi<br>BT | Main         | AWAN  | AYF6P-100002 | 2.31<br>2.99          | 2.4~2.4835GHz<br>5.15~5.85GHz | PIFA         | i-pex(MHF)     |
| LTE         | Main(B2) TX  | AWAN  | AXF6P-100013 | 1.19                  | 1850 MHz to 1910 MHz          | PIFA         | i-pex(MHF)     |
|             | Main(B4) TX  |       |              | 2.67                  | 1710 MHz to 1755 MHz          |              |                |
|             | Main(B12) TX |       |              | 0.82                  | 699 MHz to 715 MHz            |              |                |
|             | Main(B2) RX  |       |              | 2.35                  | 1930 MHz to 1990 MHz          |              | i-pex(MHF)     |
|             | Main(B4) RX  |       |              | 2.05                  | 2110 MHz to 2155 MHz          |              |                |
|             | Main(B12) RX |       |              | 2.45                  | 729 MHz to 745 MHz            |              |                |
| LTE         | Aux(B2) RX   | AWAN  | AXF6P-100005 | 2.54                  | 1930 MHz to 1990 MHz          | PIFA         | i-pex(MHF)     |
|             | Aux(B4) RX   |       |              | -0.26                 | 2110 MHz to 2155 MHz          |              |                |
|             | Aux(B12) RX  |       |              | -1.21                 | 729 MHz to 746 MHz            |              |                |
| WCDMA       | Main(B2) TX  | AWAN  | AXF6P-100013 | 1.19                  | 1850 MHz to 1910 MHz          | PIFA         | i-pex(MHF)     |
|             | Main(B5) TX  |       |              | 0.12                  | 824 MHz to 849 MHz            |              |                |
|             | Main(B2) RX  |       |              | 2.35                  | 1930 MHz to 1990 MHz          |              | i-pex(MHF)     |
|             | Main(B5) RX  |       |              | 2.62                  | 869 MHz to 894 MHz            |              |                |
| WCDMA       | Aux(B2) RX   | AWAN  | AXF6P-100005 | 2.54                  | 1930 MHz to 1990 MHz          | PIFA         | i-pex(MHF)     |
|             | Aux(B5) RX   |       |              | 1.19                  | 869 MHz to 894 MHz            |              |                |

5. The EUT was pre-tested for radiated test under following test modes:

| Pre-test Mode                                                              | Power                     |
|----------------------------------------------------------------------------|---------------------------|
| <b>Mode A</b>                                                              | <b>Power from Adapter</b> |
| Mode B                                                                     | Power from Battery        |
| From the above modes, the worst radiated test was found in <b>Mode A</b> . |                           |

6. The EUT was pre-tested for conducted test under following test modes:

| Pre-test Mode                                                              | Power                     |
|----------------------------------------------------------------------------|---------------------------|
| <b>Mode A</b>                                                              | <b>Power from Adapter</b> |
| Mode B                                                                     | Power from Laptop         |
| From the above modes, the worst radiated test was found in <b>Mode A</b> . |                           |

7. 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.

8. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

### 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≥1G:** Radiated Emission

**PLC:** Power Line Conducted Emission

**FS:** Frequency Stability

**EB:** 20dB Bandwidth measurement

#### **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<br>(System) | Tested By    |
|---------------|--------------------------|-------------------------|--------------|
| RE            | 23deg. C, 69%RH          | 120Vac, 60Hz            | Andy Ho      |
| PLC           | 25deg. C, 75%RH          | 120Vac, 60Hz            | Kevin Ko     |
| FS            | 25deg. C, 60%RH          | 120Vac, 60Hz            | Jyunchun Lin |
| EB            | 25deg. C, 60%RH          | 120Vac, 60Hz            | Jyunchun Lin |

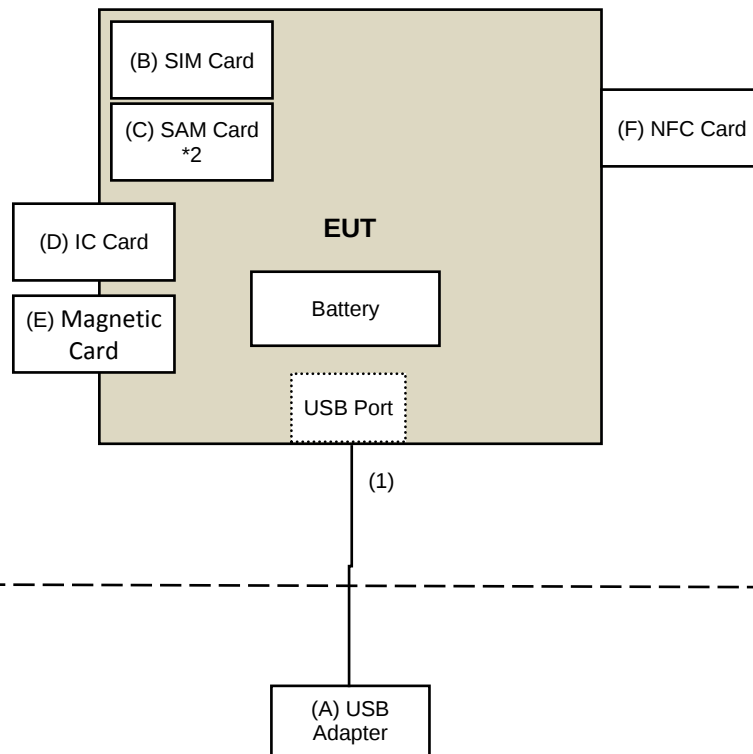
### 3.3 Description of Support Units

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            |
|----|---------------|------------|-----------------|------------|--------|--------------------|
| A. | USB Adapter   | MASS POWER | NBS10B050200VUU | NA         | NA     | Supplied by client |
| B. | SIM Card      | Keysight   | NA              | NA         | NA     | Provided by Lab    |
| C. | SAM Card *2   | XAC        | NA              | NA         | NA     | Supplied by client |
| D. | IC Card       | XAC        | NA              | NA         | NA     | Supplied by client |
| E. | Magnetic Card | XAC        | NA              | NA         | NA     | Supplied by client |
| F. | NFC Card      | XAC        | NA              | NA         | NA     | Supplied by client |

| ID | Descriptions            | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks            |
|----|-------------------------|------|------------|--------------------|--------------|--------------------|
| 1. | USB Type C to USB Cable | 1    | 1.2        | Yes                | 0            | Supplied by client |

### 3.3.1 Configuration of System under 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 Emission:

| DESCRIPTION & MANUFACTURER                 | MODEL NO.            | SERIAL NO.  | CALIBRATED DATE | CALIBRATED UNTIL |
|--------------------------------------------|----------------------|-------------|-----------------|------------------|
| Test Receiver<br>Keysight                  | N9038A               | MY54450088  | July 06, 2020   | July 05, 2021    |
| Pre-Amplifier<br>EMCI                      | EMC001340            | 980142      | May 25, 2020    | May 24, 2021     |
| Loop Antenna<br>Electro-Metrics            | EM-6879              | 264         | Feb. 18, 2020   | Feb. 17, 2021    |
| RF Cable                                   | NA                   | LOOPCAB-001 | Jan. 08, 2020   | Jan. 07, 2021    |
| RF Cable                                   | NA                   | LOOPCAB-002 | Jan. 08, 2020   | Jan. 07, 2021    |
| Pre-Amplifier<br>Mini-Circuits             | ZFL-1000VH2B         | AMP-ZFL-05  | Apr. 28, 2020   | Apr. 27, 2021    |
| Trilog Broadband<br>Antenna<br>SCHWARZBECK | VULB 9168            | 9168-361    | Nov. 11, 2019   | Nov. 10, 2020    |
| RF Cable                                   | 8D                   | 966-3-1     | Mar. 17, 2020   | Mar. 16, 2021    |
| RF Cable                                   | 8D                   | 966-3-2     | Mar. 17, 2020   | Mar. 16, 2021    |
| RF Cable                                   | 8D                   | 966-3-3     | Mar. 17, 2020   | Mar. 16, 2021    |
| Fixed attenuator<br>Mini-Circuits          | UNAT-5+              | PAD-3m-3-01 | Sep. 26, 2019   | Sep. 25, 2020    |
| Software                                   | ADT_Radiated_V8.7.08 | NA          | NA              | NA               |
| Antenna Tower & Turn<br>Table<br>Max-Full  | MF-7802              | MF780208406 | NA              | NA               |

##### Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 3.
3. Tested Date: July 06, 2020

**For other test items:**

| DESCRIPTION & MANUFACTURER           | MODEL NO.                     | SERIAL NO.    | CALIBRATED DATE | CALIBRATED UNTIL |
|--------------------------------------|-------------------------------|---------------|-----------------|------------------|
| Spectrum Analyzer R&S                | FSV40                         | 100964        | May 29, 2020    | May 28, 2021     |
| Spectrum Analyzer Keysight           | N9030A                        | MY54490679    | July 13, 2020   | July 12, 2021    |
| Power meter Anritsu                  | ML2495A                       | 1529002       | July 26, 2019   | July 25, 2020    |
| Power sensor Anritsu                 | MA2411B                       | 1339443       | July 26, 2019   | July 25, 2020    |
| Fixed Attenuator Mini-Circuits       | MDCS18N-10                    | MDCS18N-10-01 | Apr. 14, 2020   | Apr. 13, 2021    |
| Mech Switch Absorptive Mini-Circuits | MSP4TA-18+                    | 0140          | Feb. 10, 2020   | Feb. 09, 2021    |
| FXD ATTEN Mini-Circuits              | BW-S3W2+                      | MN71981       | Feb. 10, 2020   | Feb. 09, 2021    |
| Software                             | ADT_RF Test Software V6.6.5.4 | NA            | NA              | NA               |

- 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: July 15, 2020

#### 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 Average Detects Function and Specified Bandwidth with Maximum Hold Mode.

##### **Note:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 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:**

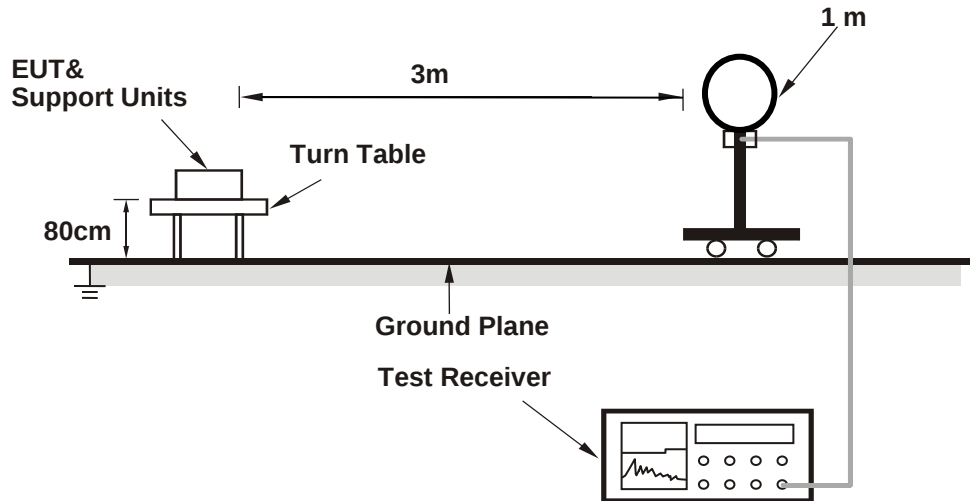
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

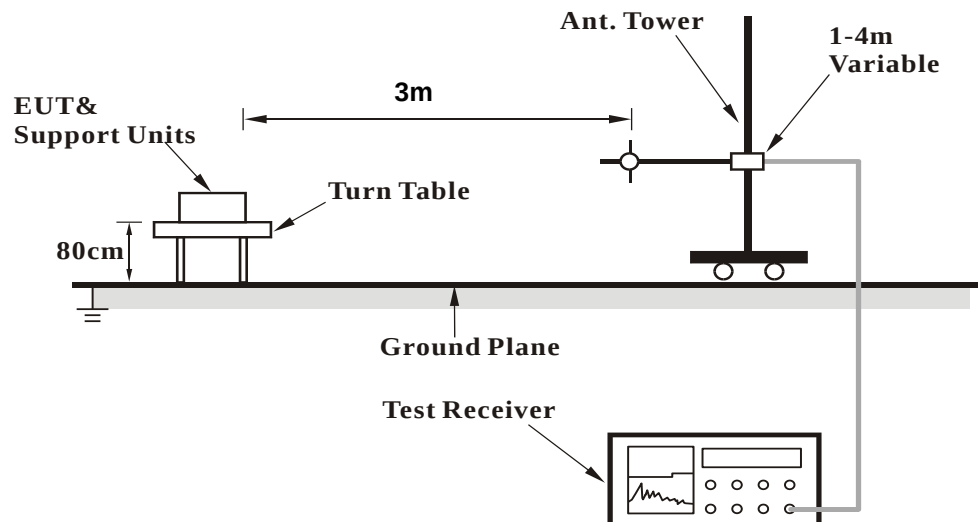
No deviation.

#### 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.

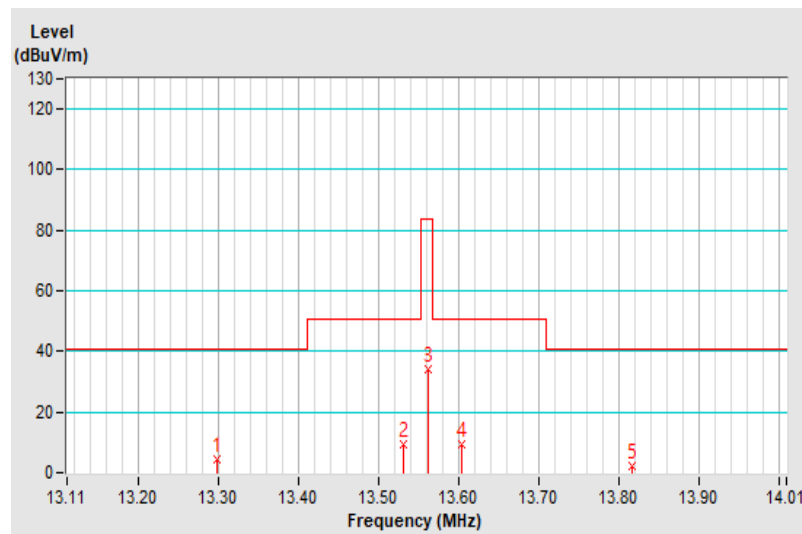
#### 4.1.7 Test Results

|                 |                  |                   |            |
|-----------------|------------------|-------------------|------------|
| Frequency Range | 13.11 ~ 14.01MHz | Detector Function | Quasi-Peak |
|-----------------|------------------|-------------------|------------|

| 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                           | 13.297          | 4.58 QP                 | 40.51          | -35.93      | 1.00               | 256                  | 48.07            | -43.49                   |
| 2                           | 13.530          | 9.31 QP                 | 50.47          | -41.16      | 1.00               | 134                  | 52.84            | -43.53                   |
| 3                           | *13.561         | 34.20 QP                | 84.00          | -49.80      | 1.00               | 126                  | 77.74            | -43.54                   |
| 4                           | 13.604          | 9.36 QP                 | 50.47          | -41.11      | 1.00               | 304                  | 52.90            | -43.54                   |
| 5                           | 13.817          | 2.25 QP                 | 40.51          | -38.26      | 1.00               | 228                  | 45.83            | -43.58                   |

#### 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. For the test distance below 0.49 ~ 30MHz is 3m, extrapolate the measured field strength to a distance of 30 meters.  
Distance factor@3m =  $40 \cdot \log(3/30) = -40\text{dB}$

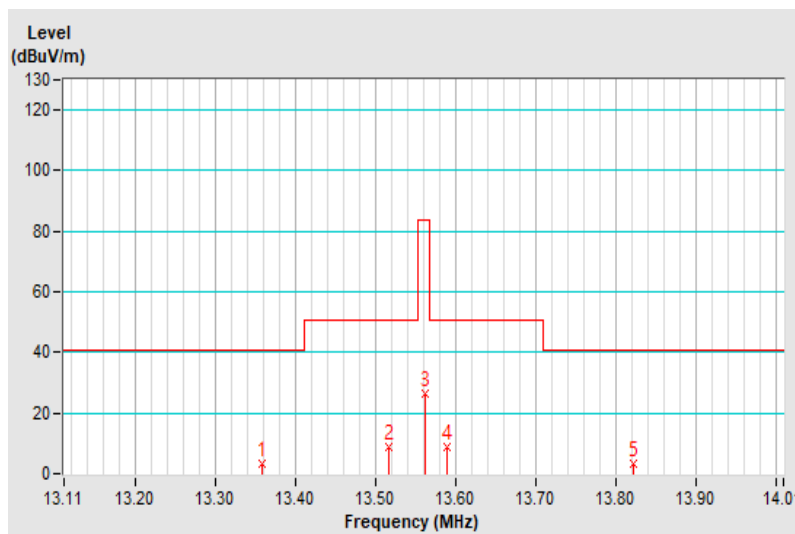


|                 |                  |                   |            |
|-----------------|------------------|-------------------|------------|
| Frequency Range | 13.11 ~ 14.01MHz | Detector Function | Quasi-Peak |
|-----------------|------------------|-------------------|------------|

| 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                                | 13.357          | 3.29 QP                 | 40.51          | -37.22      | 1.00               | 142                  | 46.79            | -43.50                   |
| 2                                | 13.517          | 8.91 QP                 | 50.47          | -41.56      | 1.00               | 265                  | 52.44            | -43.53                   |
| 3                                | *13.561         | 26.55 QP                | 84.00          | -57.45      | 1.00               | 308                  | 70.09            | -43.54                   |
| 4                                | 13.590          | 8.94 QP                 | 50.47          | -41.53      | 1.00               | 252                  | 52.48            | -43.54                   |
| 5                                | 13.822          | 3.53 QP                 | 40.51          | -36.98      | 1.00               | 203                  | 47.11            | -43.58                   |

**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. For the test distance below 0.49 ~ 30MHz is 3m, extrapolate the measured field strength to a distance of 30 meters.  
Distance factor@3m =  $40 \cdot \log(3/30) = -40\text{dB}$

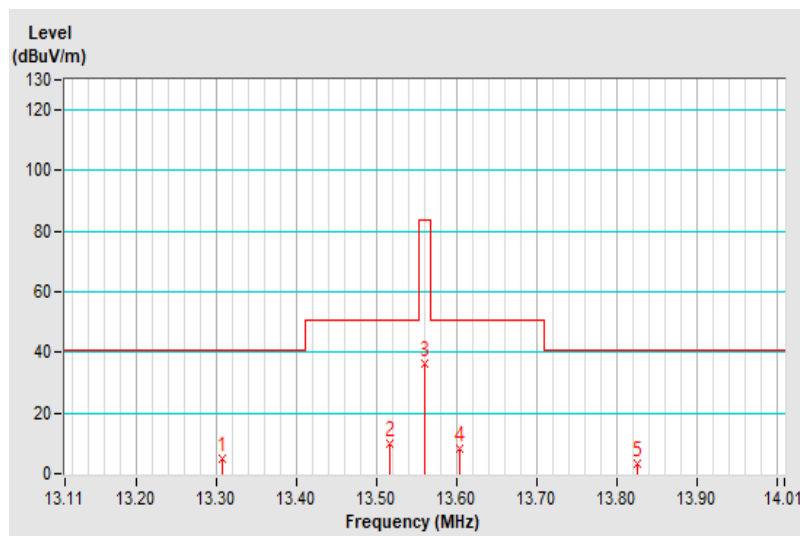


|                 |                  |                   |            |
|-----------------|------------------|-------------------|------------|
| Frequency Range | 13.11 ~ 14.01MHz | Detector Function | Quasi-Peak |
|-----------------|------------------|-------------------|------------|

| 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                                  | 13.306          | 4.85 QP                 | 40.51          | -35.66      | 1.00               | 119                  | 48.34            | -43.49                   |
| 2                                  | 13.517          | 9.91 QP                 | 50.47          | -40.56      | 1.00               | 264                  | 53.44            | -43.53                   |
| 3                                  | *13.560         | 36.34 QP                | 84.00          | -47.66      | 1.00               | 115                  | 79.88            | -43.54                   |
| 4                                  | 13.604          | 8.34 QP                 | 50.47          | -42.13      | 1.00               | 295                  | 51.88            | -43.54                   |
| 5                                  | 13.826          | 3.53 QP                 | 40.51          | -36.98      | 1.00               | 112                  | 47.11            | -43.58                   |

**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. For the test distance below 0.49 ~ 30MHz is 3m, extrapolate the measured field strength to a distance of 30 meters.  
Distance factor@3m =  $40 \cdot \log(3/30) = -40\text{dB}$

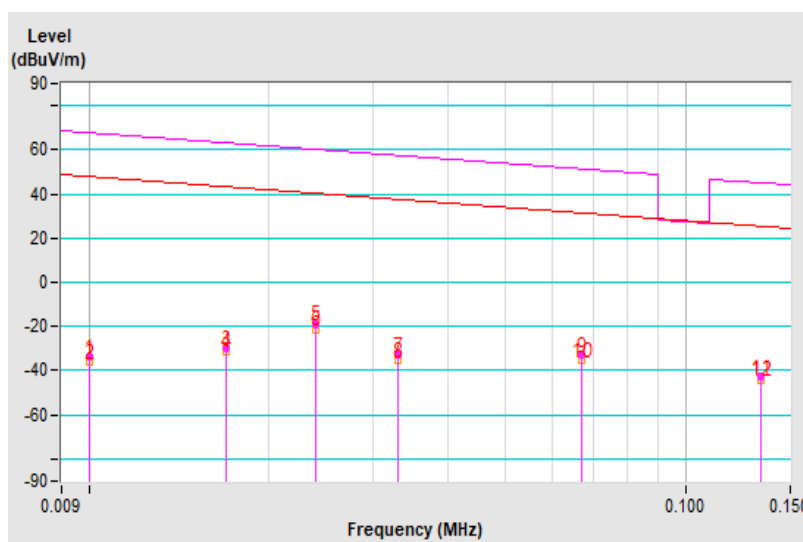


|                 |               |                   |              |
|-----------------|---------------|-------------------|--------------|
| Frequency Range | 9kHz ~ 150kHz | Detector Function | Peak/Average |
|-----------------|---------------|-------------------|--------------|

| 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                           | 0.010           | -33.72 PK               | 67.60          | -101.32     | 1.00               | 301                  | 9.85             | -43.57                   |
| 2                           | 0.010           | -36.14 AV               | 47.60          | -83.74      | 1.00               | 301                  | 7.43             | -43.57                   |
| 3                           | 0.017           | -29.93 PK               | 62.99          | -92.92      | 1.00               | 142                  | 16.92            | -46.85                   |
| 4                           | 0.017           | -31.16 AV               | 43.00          | -74.16      | 1.00               | 142                  | 15.69            | -46.85                   |
| 5                           | 0.024           | -19.03 PK               | 60.00          | -79.03      | 1.00               | 258                  | 30.94            | -49.97                   |
| 6                           | 0.024           | -21.12 AV               | 40.00          | -61.12      | 1.00               | 258                  | 28.85            | -49.97                   |
| 7                           | 0.033           | -33.15 PK               | 57.23          | -90.38      | 1.00               | 334                  | 20.04            | -53.19                   |
| 8                           | 0.033           | -35.26 AV               | 37.23          | -72.49      | 1.00               | 334                  | 17.93            | -53.19                   |
| 9                           | 0.067           | -33.00 PK               | 51.07          | -84.07      | 1.00               | 142                  | 26.28            | -59.28                   |
| 10                          | 0.067           | -35.13 AV               | 31.08          | -66.21      | 1.00               | 142                  | 24.15            | -59.28                   |
| 11                          | 0.134           | -42.99 PK               | 45.06          | -88.05      | 1.00               | 269                  | 22.22            | -65.21                   |
| 12                          | 0.134           | -44.27 AV               | 25.06          | -69.33      | 1.00               | 269                  | 20.94            | -65.21                   |

**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. For the test distance below 0.49MHz is 3m, extrapolate the measured field strength to a distance of 300 meters.  
Distance factor@3m =  $40 \cdot \log(3/300) = -80\text{dB}$

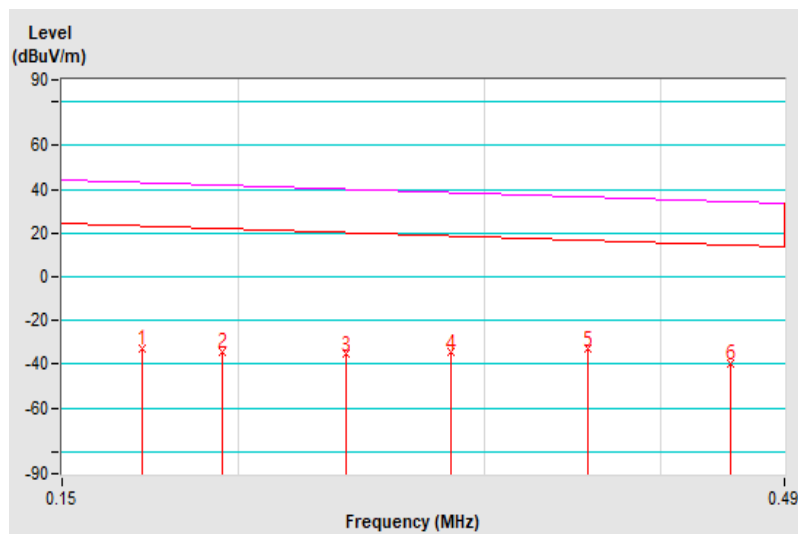


|                 |                 |                   |              |
|-----------------|-----------------|-------------------|--------------|
| Frequency Range | 150kHz ~ 490kHz | Detector Function | Peak/Average |
|-----------------|-----------------|-------------------|--------------|

| 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                           | 0.171           | -32.73 QP               | 22.94          | -55.67      | 1.00               | 165                  | 34.02            | -66.75                   |
| 2                           | 0.195           | -34.07 QP               | 21.80          | -55.87      | 1.00               | 266                  | 33.67            | -67.74                   |
| 3                           | 0.239           | -35.13 QP               | 20.03          | -55.16      | 1.00               | 264                  | 34.44            | -69.57                   |
| 4                           | 0.284           | -34.48 QP               | 18.54          | -53.02      | 1.00               | 179                  | 36.95            | -71.43                   |
| 5                           | 0.355           | -32.85 QP               | 16.60          | -49.45      | 1.00               | 264                  | 40.19            | -73.04                   |
| 6                           | 0.449           | -39.53 QP               | 14.56          | -54.09      | 1.00               | 171                  | 35.11            | -74.64                   |

**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. For the test distance below 0.49MHz is 3m, extrapolate the measured field strength to a distance of 300 meters.  
Distance factor@3m =  $40 \cdot \log(3/300) = -80\text{dB}$

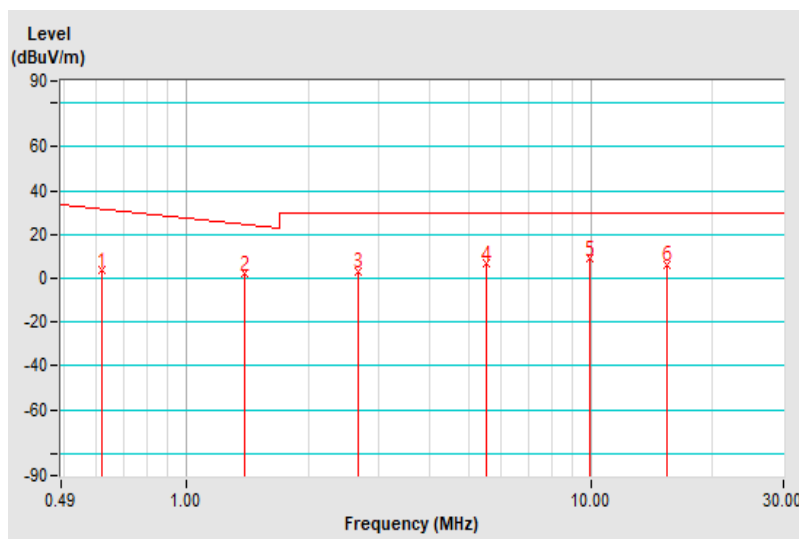


|                 |                |                   |              |
|-----------------|----------------|-------------------|--------------|
| Frequency Range | 490kHz ~ 30MHz | Detector Function | Peak/Average |
|-----------------|----------------|-------------------|--------------|

| 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                           | 0.618           | 3.70 QP                 | 31.78          | -28.08      | 1.00               | 245                  | 40.14            | -36.44                   |
| 2                           | 1.388           | 2.11 QP                 | 24.75          | -22.64      | 1.00               | 174                  | 42.37            | -40.26                   |
| 3                           | 2.671           | 3.23 QP                 | 29.54          | -26.31      | 1.00               | 159                  | 46.28            | -43.05                   |
| 4                           | 5.537           | 6.75 QP                 | 29.54          | -22.79      | 1.00               | 263                  | 50.52            | -43.77                   |
| 5                           | 9.942           | 8.87 QP                 | 29.54          | -20.67      | 1.00               | 164                  | 51.81            | -42.94                   |
| 6                           | 15.459          | 6.17 QP                 | 29.54          | -23.37      | 1.00               | 263                  | 50.01            | -43.84                   |

#### 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. For the test distance below 0.49 ~ 30MHz is 3m, extrapolate the measured field strength to a distance of 300 meters.  
Distance factor@3m =  $40 \cdot \log(3/30) = -40\text{dB}$

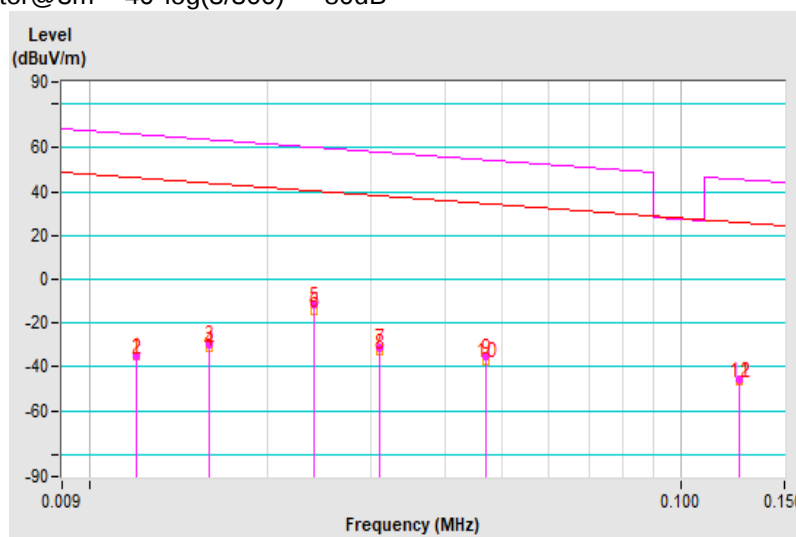


|                 |               |                   |              |
|-----------------|---------------|-------------------|--------------|
| Frequency Range | 9kHz ~ 150kHz | Detector Function | Peak/Average |
|-----------------|---------------|-------------------|--------------|

| 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                                | 0.012           | -34.76 PK               | 66.02          | -100.78     | 1.00               | 302                  | 9.75             | -44.51                   |
| 2                                | 0.012           | -35.13 AV               | 46.02          | -81.15      | 1.00               | 302                  | 9.38             | -44.51                   |
| 3                                | 0.016           | -29.52 PK               | 63.52          | -93.04      | 1.00               | 245                  | 16.86            | -46.38                   |
| 4                                | 0.016           | -31.42 AV               | 43.52          | -74.94      | 1.00               | 245                  | 14.96            | -46.38                   |
| 5                                | 0.024           | -11.68 PK               | 60.00          | -71.68      | 1.00               | 138                  | 38.29            | -49.97                   |
| 6                                | 0.024           | -14.15 AV               | 40.00          | -54.15      | 1.00               | 138                  | 35.82            | -49.97                   |
| 7                                | 0.031           | -31.23 PK               | 57.77          | -89.00      | 1.00               | 267                  | 21.52            | -52.75                   |
| 8                                | 0.031           | -33.14 AV               | 37.78          | -70.92      | 1.00               | 267                  | 19.61            | -52.75                   |
| 9                                | 0.047           | -35.27 PK               | 54.16          | -89.43      | 1.00               | 142                  | 20.98            | -56.25                   |
| 10                               | 0.047           | -37.26 AV               | 34.16          | -71.42      | 1.00               | 142                  | 18.99            | -56.25                   |
| 11                               | 0.126           | -45.86 PK               | 45.59          | -91.45      | 1.00               | 263                  | 19.01            | -64.87                   |
| 12                               | 0.126           | -46.47 AV               | 25.59          | -72.06      | 1.00               | 263                  | 18.40            | -64.87                   |

**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. For the test distance below 0.49MHz is 3m, extrapolate the measured field strength to a distance of 300 meters.  
Distance factor@3m =  $40 \cdot \log(3/300) = -80\text{dB}$

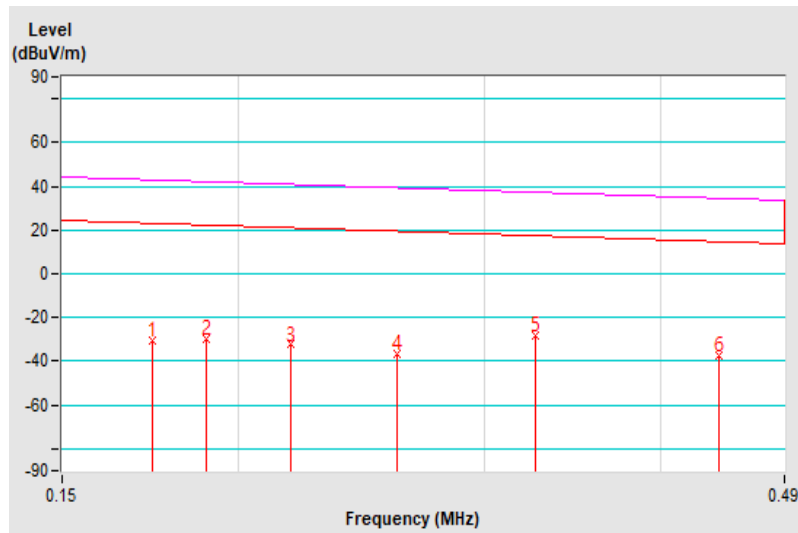


|                 |                 |                   |              |
|-----------------|-----------------|-------------------|--------------|
| Frequency Range | 150kHz ~ 490kHz | Detector Function | Peak/Average |
|-----------------|-----------------|-------------------|--------------|

| 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                                | 0.174           | -30.41 QP               | 22.79          | -53.20      | 1.00               | 141                  | 36.47            | -66.88                   |
| 2                                | 0.190           | -29.54 QP               | 22.03          | -51.57      | 1.00               | 302                  | 38.00            | -67.54                   |
| 3                                | 0.218           | -32.28 QP               | 20.83          | -53.11      | 1.00               | 269                  | 36.43            | -68.71                   |
| 4                                | 0.260           | -36.55 QP               | 19.30          | -55.85      | 1.00               | 147                  | 33.89            | -70.44                   |
| 5                                | 0.326           | -27.92 QP               | 17.34          | -45.26      | 1.00               | 224                  | 44.62            | -72.54                   |
| 6                                | 0.440           | -37.41 QP               | 14.73          | -52.14      | 1.00               | 196                  | 37.08            | -74.49                   |

**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. For the test distance below 0.49MHz is 3m, extrapolate the measured field strength to a distance of 300 meters.  
Distance factor@3m =  $40 \cdot \log(3/300) = -80\text{dB}$

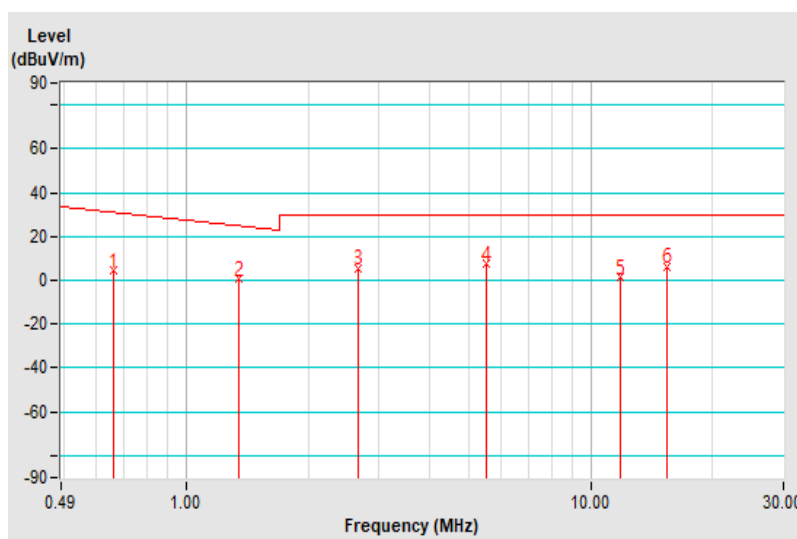


|                 |                |                   |            |
|-----------------|----------------|-------------------|------------|
| Frequency Range | 490kHz ~ 30MHz | Detector Function | Quasi-Peak |
|-----------------|----------------|-------------------|------------|

| 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                                | 0.661           | 4.32 QP                 | 31.20          | -26.88      | 1.00               | 142                  | 41.10            | -36.78                   |
| 2                                | 1.345           | 0.52 QP                 | 25.02          | -24.50      | 1.00               | 265                  | 40.70            | -40.18                   |
| 3                                | 2.671           | 5.51 QP                 | 29.54          | -24.03      | 1.00               | 332                  | 48.56            | -43.05                   |
| 4                                | 5.537           | 7.42 QP                 | 29.54          | -22.12      | 1.00               | 263                  | 51.19            | -43.77                   |
| 5                                | 11.866          | 1.47 QP                 | 29.54          | -28.07      | 1.00               | 202                  | 44.72            | -43.25                   |
| 6                                | 15.459          | 6.34 QP                 | 29.54          | -23.20      | 1.00               | 224                  | 50.18            | -43.84                   |

**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. For the test distance below 0.49 ~ 30MHz is 3m, extrapolate the measured field strength to a distance of 300 meters.  
Distance factor@3m =  $40 \cdot \log(3/30) = -40\text{dB}$

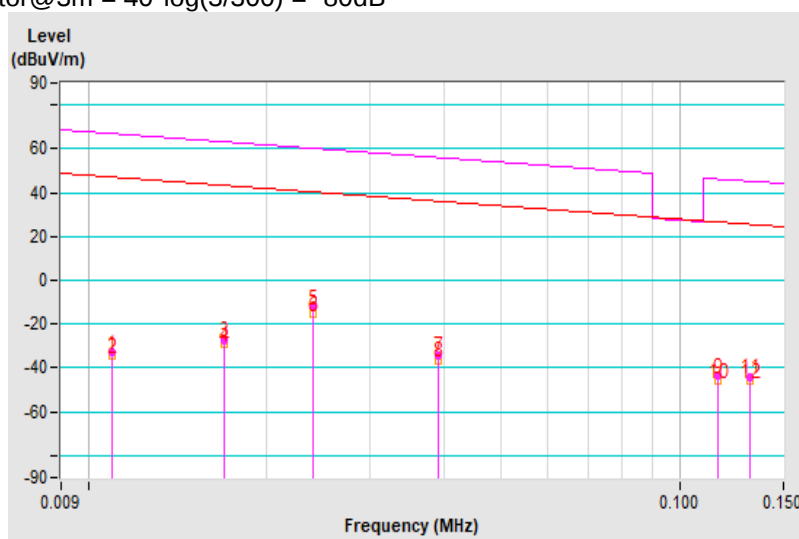


|                 |               |                   |              |
|-----------------|---------------|-------------------|--------------|
| Frequency Range | 9kHz ~ 150kHz | Detector Function | Peak/Average |
|-----------------|---------------|-------------------|--------------|

| 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                                  | 0.011           | -32.98 PK               | 66.78          | -99.76      | 1.00               | 265                  | 11.06            | -44.04                   |
| 2                                  | 0.011           | -34.56 AV               | 46.78          | -81.34      | 1.00               | 265                  | 9.48             | -44.04                   |
| 3                                  | 0.017           | -27.16 PK               | 62.99          | -90.15      | 1.00               | 302                  | 19.69            | -46.85                   |
| 4                                  | 0.017           | -29.26 AV               | 43.00          | -72.26      | 1.00               | 302                  | 17.59            | -46.85                   |
| 5                                  | 0.024           | -12.33 PK               | 60.00          | -72.33      | 1.00               | 159                  | 37.64            | -49.97                   |
| 6                                  | 0.024           | -15.42 AV               | 40.00          | -55.42      | 1.00               | 159                  | 34.55            | -49.97                   |
| 7                                  | 0.039           | -34.33 PK               | 55.78          | -90.11      | 1.00               | 264                  | 20.18            | -54.51                   |
| 8                                  | 0.039           | -36.41 AV               | 35.78          | -72.19      | 1.00               | 264                  | 18.10            | -54.51                   |
| 9                                  | 0.116           | -43.55 PK               | 46.31          | -89.86      | 1.00               | 311                  | 20.92            | -64.47                   |
| 10                                 | 0.116           | -46.13 AV               | 26.31          | -72.44      | 1.00               | 311                  | 18.34            | -64.47                   |
| 11                                 | 0.132           | -43.93 PK               | 45.19          | -89.12      | 1.00               | 247                  | 21.19            | -65.12                   |
| 12                                 | 0.132           | -46.13 AV               | 25.19          | -71.32      | 1.00               | 247                  | 18.99            | -65.12                   |

**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. For the test distance below 0.49MHz is 3m, extrapolate the measured field strength to a distance of 300 meters.  
Distance factor@3m =  $40 \cdot \log(3/300) = -80\text{dB}$

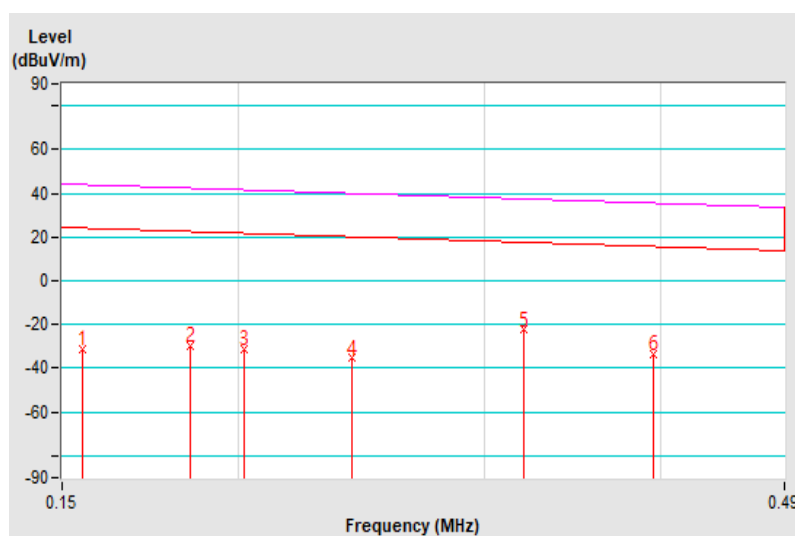


|                 |                 |                   |              |
|-----------------|-----------------|-------------------|--------------|
| Frequency Range | 150kHz ~ 490kHz | Detector Function | Peak/Average |
|-----------------|-----------------|-------------------|--------------|

| 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                                  | 0.155           | -31.20 QP               | 23.80          | -55.00      | 1.00               | 302                  | 34.89            | -66.09                   |
| 2                                  | 0.185           | -29.56 QP               | 22.26          | -51.82      | 1.00               | 334                  | 37.76            | -67.32                   |
| 3                                  | 0.202           | -31.11 QP               | 21.50          | -52.61      | 1.00               | 264                  | 36.93            | -68.04                   |
| 4                                  | 0.241           | -35.26 QP               | 19.96          | -55.22      | 1.00               | 206                  | 34.39            | -69.65                   |
| 5                                  | 0.320           | -22.22 QP               | 17.50          | -39.72      | 1.00               | 145                  | 50.22            | -72.44                   |
| 6                                  | 0.395           | -33.25 QP               | 15.67          | -48.92      | 1.00               | 142                  | 40.46            | -73.71                   |

**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. For the test distance below 0.49MHz is 3m, extrapolate the measured field strength to a distance of 300 meters.  
Distance factor@3m =  $40 \cdot \log(3/300) = -80\text{dB}$

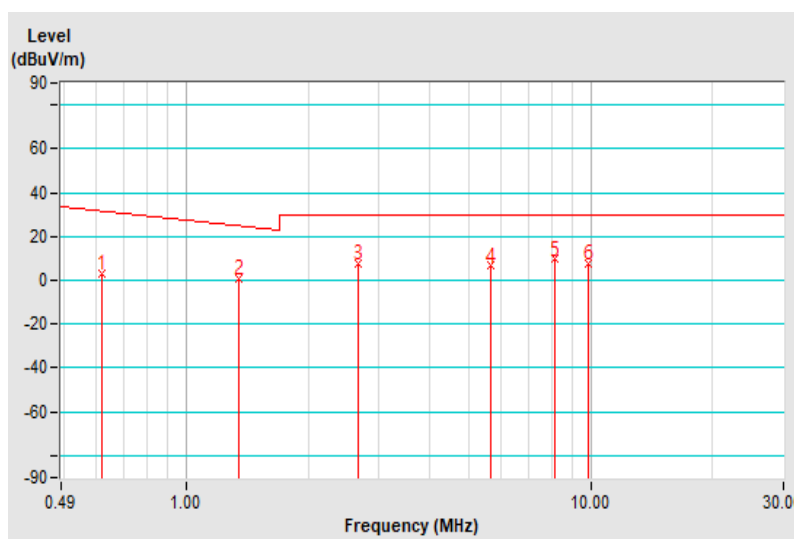


|                 |                |                   |            |
|-----------------|----------------|-------------------|------------|
| Frequency Range | 490kHz ~ 30MHz | Detector Function | Quasi-Peak |
|-----------------|----------------|-------------------|------------|

| 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                                  | 0.618           | 3.24 QP                 | 31.78          | -28.54      | 1.00               | 116                  | 39.68            | -36.44                   |
| 2                                  | 1.345           | 0.78 QP                 | 25.02          | -24.24      | 1.00               | 264                  | 40.96            | -40.18                   |
| 3                                  | 2.671           | 7.89 QP                 | 29.54          | -21.65      | 1.00               | 206                  | 50.94            | -43.05                   |
| 4                                  | 5.665           | 6.69 QP                 | 29.54          | -22.85      | 1.00               | 302                  | 50.43            | -43.74                   |
| 5                                  | 8.145           | 9.76 QP                 | 29.54          | -19.78      | 1.00               | 242                  | 53.03            | -43.27                   |
| 6                                  | 9.856           | 7.63 QP                 | 29.54          | -21.91      | 1.00               | 142                  | 50.59            | -42.96                   |

**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. For the test distance below 0.49 ~ 30MHz is 3m, extrapolate the measured field strength to a distance of 300 meters.  
Distance factor@3m =  $40 \cdot \log(3/30) = -40\text{dB}$

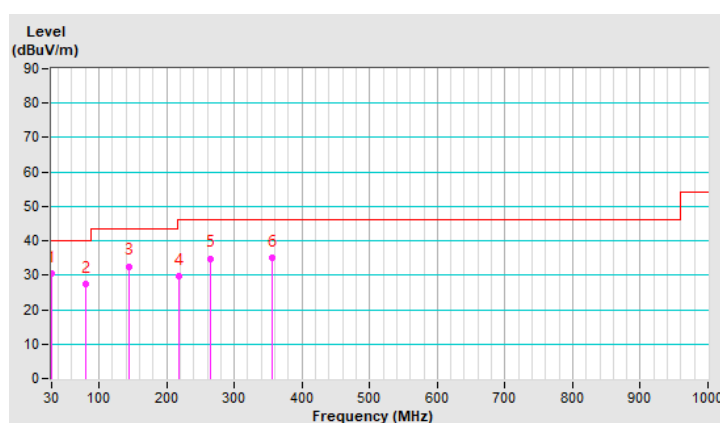


|                 |                 |                   |            |
|-----------------|-----------------|-------------------|------------|
| Frequency Range | 30MHz ~ 1000MHz | Detector Function | Quasi-Peak |
|-----------------|-----------------|-------------------|------------|

| 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                                                    | 30.39           | 30.5 QP                 | 40.0           | -9.5        | 2.00 H             | 0                    | 39.3             | -8.8                     |
| 2                                                    | 81.17           | 27.6 QP                 | 40.0           | -12.4       | 2.00 H             | 328                  | 40.4             | -12.8                    |
| 3                                                    | 145.24          | 32.6 QP                 | 43.5           | -10.9       | 2.00 H             | 77                   | 39.6             | -7.0                     |
| 4                                                    | 219.08          | 29.8 QP                 | 46.0           | -16.2       | 1.50 H             | 245                  | 39.6             | -9.8                     |
| 5                                                    | 264.89          | 34.9 QP                 | 46.0           | -11.1       | 1.00 H             | 96                   | 42.2             | -7.3                     |
| 6                                                    | 356.02          | 35.1 QP                 | 46.0           | -10.9       | 1.00 H             | 245                  | 39.2             | -4.1                     |

#### 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 of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

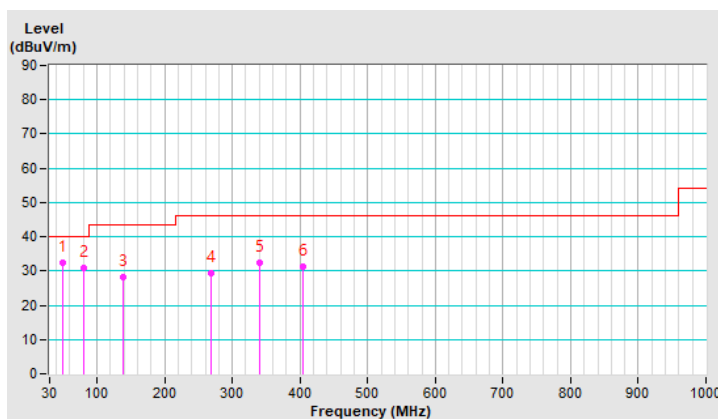


|                 |                 |                   |            |
|-----------------|-----------------|-------------------|------------|
| Frequency Range | 30MHz ~ 1000MHz | Detector Function | Quasi-Peak |
|-----------------|-----------------|-------------------|------------|

| 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                                                  | 50.05           | 32.4 QP                 | 40.0           | -7.6        | 2.00 V             | 40                   | 39.9             | -7.5                     |
| 2                                                  | 80.78           | 30.9 QP                 | 40.0           | -9.1        | 1.00 V             | 68                   | 43.6             | -12.7                    |
| 3                                                  | 139.00          | 28.2 QP                 | 43.5           | -15.3       | 1.00 V             | 57                   | 35.5             | -7.3                     |
| 4                                                  | 268.01          | 29.2 QP                 | 46.0           | -16.8       | 1.50 V             | 135                  | 36.3             | -7.1                     |
| 5                                                  | 340.01          | 32.3 QP                 | 46.0           | -13.7       | 2.00 V             | 275                  | 36.9             | -4.6                     |
| 6                                                  | 404.01          | 31.1 QP                 | 46.0           | -14.9       | 1.50 V             | 265                  | 34.0             | -2.9                     |

**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 of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



## 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 | Oct. 23, 2019   | Oct. 22, 2020    |
| Line-Impedance Stabilization Network (for EUT) R&S        | ESH3-Z5             | 848773/004 | Oct. 23, 2019   | Oct. 22, 2020    |
| Line-Impedance Stabilization Network (for Peripheral) R&S | ESH3-Z5             | 835239/001 | Mar. 19, 2020   | Mar. 18, 2021    |
| 50 ohms Terminator                                        | 50                  | 3          | Oct. 23, 2019   | Oct. 22, 2020    |
| RF Cable                                                  | 5D-FB               | COCCAB-001 | Sep. 27, 2019   | Sep. 26, 2020    |
| Fixed attenuator EMCI                                     | STI02-2200-10       | 005        | Aug. 30, 2019   | Aug. 29, 2020    |
| Software BVADT                                            | BVADT_Cond_V7.3.7.4 | NA         | NA              | NA               |

**Note:**

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
- 3 Tested Date: July 05, 2020

#### 4.2.3 Test Procedures

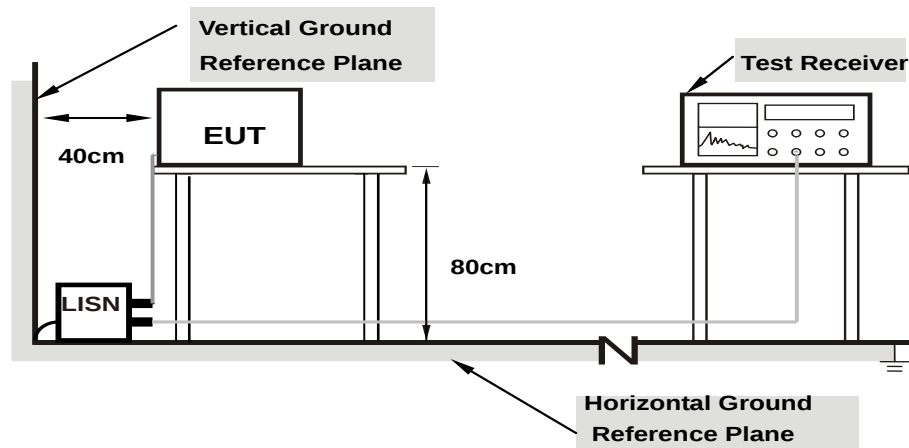
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. 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.

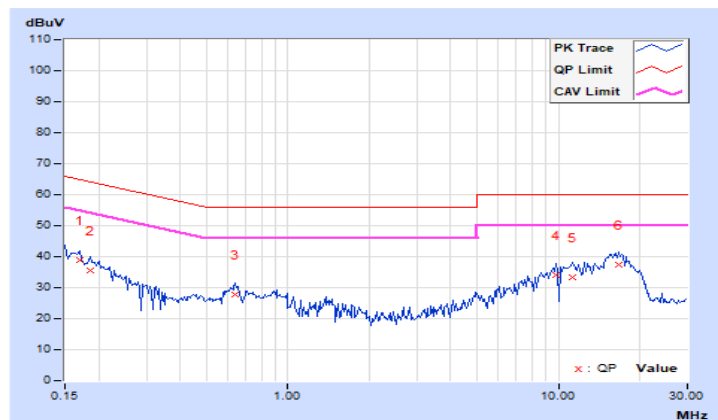
#### 4.2.7 Test Results

| Phase | Line (L) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|-------|----------|-------------------|--------------------------------|
|-------|----------|-------------------|--------------------------------|

| No | Freq.<br>[MHz] | Corr.<br>Factor | Reading Value<br>[dB (uV)] |       | Emission Level<br>[dB (uV)] |       | Limit<br>[dB (uV)] |       | Margin<br>(dB) |        |
|----|----------------|-----------------|----------------------------|-------|-----------------------------|-------|--------------------|-------|----------------|--------|
|    |                | (dB)            | Q.P.                       | AV.   | Q.P.                        | AV.   | Q.P.               | AV.   | Q.P.           | AV.    |
|    |                |                 |                            |       |                             |       |                    |       |                |        |
| 1  | 0.16953        | 10.03           | 28.95                      | 10.37 | 38.98                       | 20.40 | 64.98              | 54.98 | -26.00         | -34.58 |
| 2  | 0.18516        | 10.03           | 25.64                      | 12.05 | 35.67                       | 22.08 | 64.25              | 54.25 | -28.58         | -32.17 |
| 3  | 0.64219        | 10.08           | 17.77                      | 10.15 | 27.85                       | 20.23 | 56.00              | 46.00 | -28.15         | -25.77 |
| 4  | 9.74609        | 10.76           | 23.14                      | 14.32 | 33.90                       | 25.08 | 60.00              | 50.00 | -26.10         | -24.92 |
| 5  | 11.29297       | 10.87           | 22.53                      | 14.48 | 33.40                       | 25.35 | 60.00              | 50.00 | -26.60         | -24.65 |
| 6  | 16.61719       | 11.25           | 26.26                      | 18.28 | 37.51                       | 29.53 | 60.00              | 50.00 | -22.49         | -20.47 |

#### 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

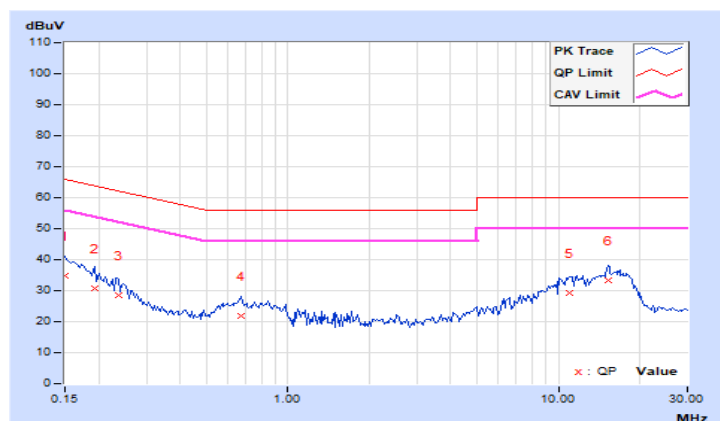


|       |             |                   |                                |
|-------|-------------|-------------------|--------------------------------|
| Phase | Neutral (N) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|-------|-------------|-------------------|--------------------------------|

| No | Freq.<br>[MHz] | Corr.  | Reading Value |       | Emission Level |       | Limit     |       | Margin |        |
|----|----------------|--------|---------------|-------|----------------|-------|-----------|-------|--------|--------|
|    |                | Factor | [dB (uV)]     |       | [dB (uV)]      |       | [dB (uV)] |       | (dB)   |        |
|    |                | (dB)   | Q.P.          | AV.   | Q.P.           | AV.   | Q.P.      | AV.   | Q.P.   | AV.    |
| 1  | 0.15000        | 10.02  | 24.96         | 11.25 | 34.98          | 21.27 | 66.00     | 56.00 | -31.02 | -34.73 |
| 2  | 0.19297        | 10.04  | 20.70         | 5.13  | 30.74          | 15.17 | 63.91     | 53.91 | -33.17 | -38.74 |
| 3  | 0.23594        | 10.04  | 18.65         | 3.58  | 28.69          | 13.62 | 62.24     | 52.24 | -33.55 | -38.62 |
| 4  | 0.66953        | 10.09  | 11.61         | 5.58  | 21.70          | 15.67 | 56.00     | 46.00 | -34.30 | -30.33 |
| 5  | 11.05078       | 10.75  | 18.64         | 8.35  | 29.39          | 19.10 | 60.00     | 50.00 | -30.61 | -30.90 |
| 6  | 15.24219       | 10.97  | 22.53         | 11.55 | 33.50          | 22.52 | 60.00     | 50.00 | -26.50 | -27.48 |

**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

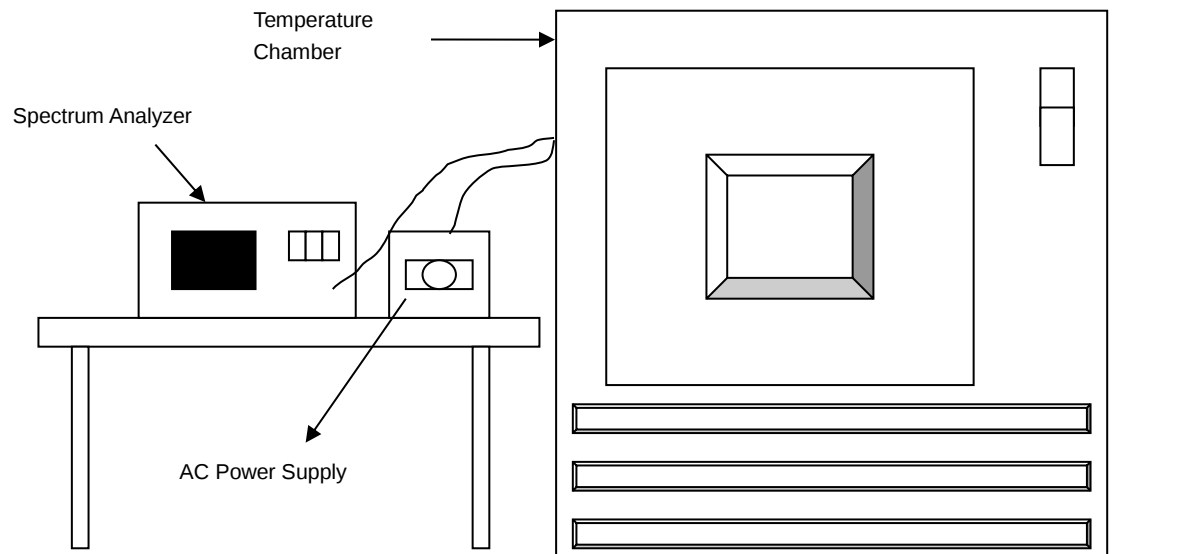


### 4.3 Frequency Stability

#### 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 AC voltage.
- Turned the EUT on and coupled its output to a spectrum analyzer.
- Turned the EUT off and set the chamber to the highest temperature specified.
- Allowed sufficient time (approximately 30 min) for the temperature of the chamber to stabilize then turned the EUT on and measured the operating frequency after 2, 5, and 10 minutes.
- Repeated step 2 and 3 with the temperature chamber set to the lowest temperature.
- 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

Same as Item 4.1.6.

#### 4.3.7 Test Result

| Frequency Stability Versus Temp. |                          |                       |                    |                       |                    |                       |                    |                       |                    |
|----------------------------------|--------------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|
| TEMP.<br>(°C)                    | Power<br>Supply<br>(Vac) | 0 Minute              |                    | 2 Minutes             |                    | 5 Minutes             |                    | 10 Minutes            |                    |
|                                  |                          | Measured<br>Frequency | Frequency<br>Drift | Measured<br>Frequency | Frequency<br>Drift | Measured<br>Frequency | Frequency<br>Drift | Measured<br>Frequency | Frequency<br>Drift |
|                                  |                          | (MHz)                 | %                  | (MHz)                 | %                  | (MHz)                 | %                  | (MHz)                 | %                  |
| 40                               | 120                      | 13.56006              | 0.00044            | 13.56005              | 0.00037            | 13.56006              | 0.00044            | 13.56006              | 0.00044            |
| 30                               | 120                      | 13.55996              | -0.00029           | 13.55996              | -0.00029           | 13.55997              | -0.00022           | 13.55997              | -0.00022           |
| 20                               | 120                      | 13.55993              | -0.00052           | 13.55992              | -0.00059           | 13.55992              | -0.00059           | 13.55993              | -0.00052           |
| 10                               | 120                      | 13.55995              | -0.00037           | 13.55996              | -0.00029           | 13.55996              | -0.00029           | 13.55996              | -0.00029           |
| 0                                | 120                      | 13.56007              | 0.00052            | 13.56006              | 0.00044            | 13.56006              | 0.00044            | 13.56006              | 0.00044            |

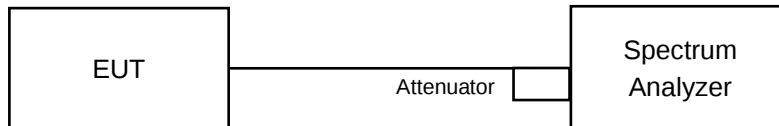
| Frequency Stability Versus Voltage |                          |                       |                    |                       |                    |                       |                    |                       |                    |
|------------------------------------|--------------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|
| TEMP.<br>(°C)                      | Power<br>Supply<br>(Vac) | 0 Minute              |                    | 2 Minutes             |                    | 5 Minutes             |                    | 10 Minutes            |                    |
|                                    |                          | Measured<br>Frequency | Frequency<br>Drift | Measured<br>Frequency | Frequency<br>Drift | Measured<br>Frequency | Frequency<br>Drift | Measured<br>Frequency | Frequency<br>Drift |
|                                    |                          | (MHz)                 | %                  | (MHz)                 | %                  | (MHz)                 | %                  | (MHz)                 | %                  |
| 20                                 | 138                      | 13.55993              | -0.00052           | 13.55992              | -0.00059           | 13.55992              | -0.00059           | 13.55993              | -0.00052           |
|                                    | 120                      | 13.55993              | -0.00052           | 13.55992              | -0.00059           | 13.55992              | -0.00059           | 13.55993              | -0.00052           |
|                                    | 102                      | 13.55993              | -0.00052           | 13.55992              | -0.00059           | 13.55992              | -0.00059           | 13.55993              | -0.00052           |

#### 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 10kHz RBW and 30kHz 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

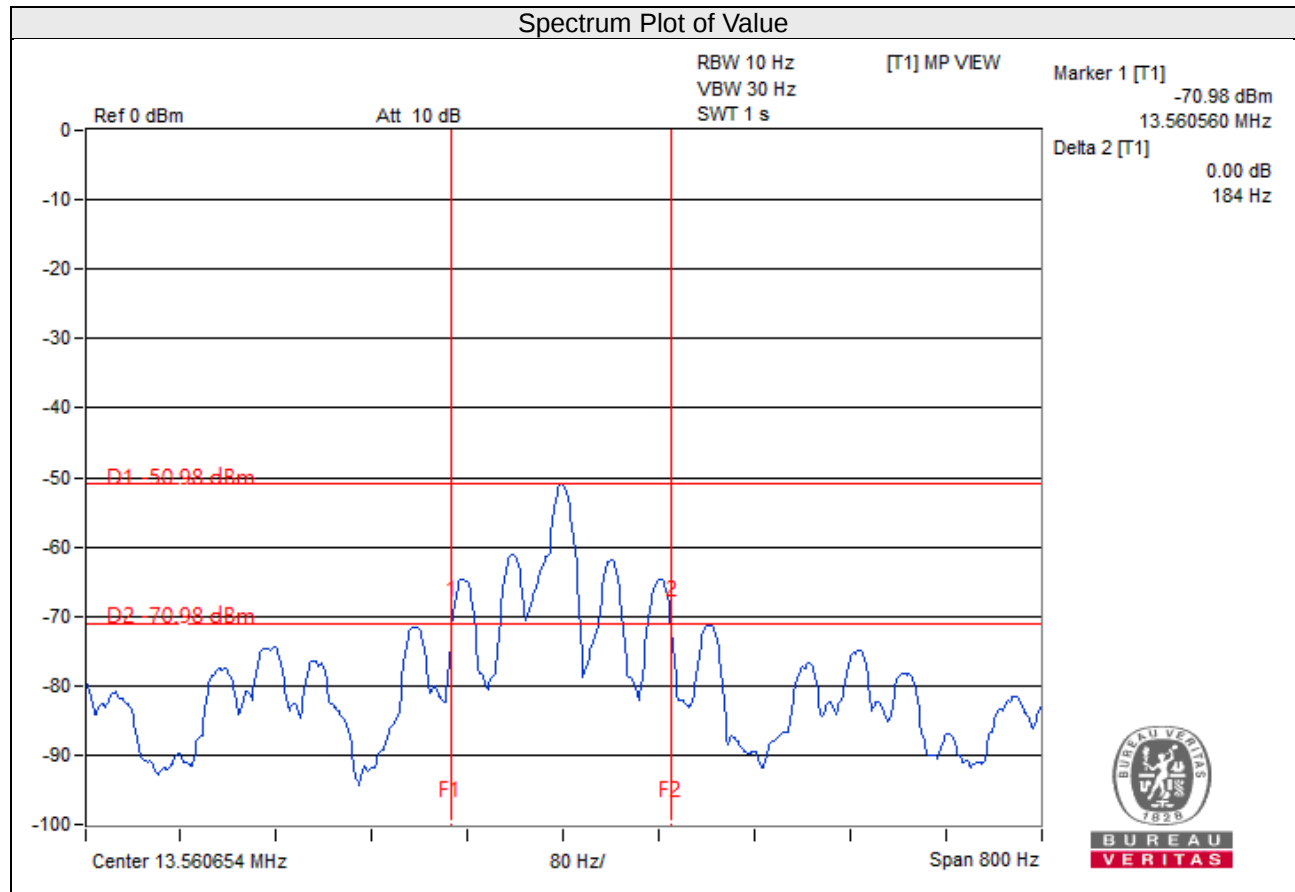
No deviation.

##### 4.4.6 EUT Operating Conditions

Same as Item 4.1.6.

#### 4.4.7 Test Results

| 20dBc Point (Low)<br>(MHz) | 20dBc Point (High)<br>(MHz) | Operating Frequency<br>Band (MHz) | Pass/Fail |
|----------------------------|-----------------------------|-----------------------------------|-----------|
| 13.56056                   | 13.560744                   | 13.11 – 14.01                     | 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.

If you have any comments, please feel free to contact us at the following:

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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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