



No.:  
**FCCSZ2025-0015-RF2**

## TEST REPORT

**FCC ID** : 2ASWYSOLARGUARDX110

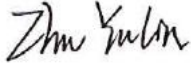
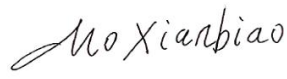
**NAME OF SAMPLE** : Solar powered E-lock

**APPLICANT** : SHENZHEN TOPFLYtech CO., LIMITED

**CLASSIFICATION OF TEST** : N/A

**CVC Testing Technology (Shenzhen) Co., Ltd.**



|                                                                                                                                                |                                                                                                                                                                                |                                                                                                                                                   |                               |
|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| <b>Applicant</b>                                                                                                                               | Name: SHENZHEN TOPFLYtech CO., LIMITED<br>Address: Rm 409, Scientific Research Building, Tsinghua Hi-tech Park Hi-tech Industrial Nanshan District, Shenzhen, Guangdong, China |                                                                                                                                                   |                               |
| <b>Manufacturer</b>                                                                                                                            | Name: SHENZHEN TOPFLYtech CO., LIMITED<br>Address: Rm 409, Scientific Research Building, Tsinghua Hi-tech Park Hi-tech Industrial Nanshan District, Shenzhen, Guangdong, China |                                                                                                                                                   |                               |
| <b>Equipment Under Test</b>                                                                                                                    | Product Name: Solar powered E-lock<br>Model Name: SolarGuardX 110<br>Brand Name: TOPFLYtech<br>Serial NO.: N/A<br>Sample NO.: 4-1                                              |                                                                                                                                                   |                               |
| Date of Receipt.                                                                                                                               | Feb. 09, 2025                                                                                                                                                                  | Date of Testing                                                                                                                                   | Feb. 09, 2025 ~ Apr. 25, 2025 |
| <b>Test Specification</b>                                                                                                                      |                                                                                                                                                                                | <b>Test Result</b>                                                                                                                                |                               |
| FCC Part 15, Subpart C, Section 15.225                                                                                                         |                                                                                                                                                                                | PASS                                                                                                                                              |                               |
| <b>Evaluation of Test Result</b>                                                                                                               | The equipment under test was found to comply with the requirements of the standards applied.<br><br>Seal of CVC<br><b>Issue Date: Apr. 25, 2025</b>                            |                                                                                                                                                   |                               |
| Compiled by:<br><br><b>Zhu Yulin</b><br>Name      Signature | Reviewed by:<br><br><b>Mo Xianbiao</b><br>Name      Signature                               | Approved by:<br><br><b>Dong Sanbi</b><br>Name      Signature |                               |
| <b>Other Aspects: NONE.</b>                                                                                                                    |                                                                                                                                                                                |                                                                                                                                                   |                               |
| Abbreviations: OK, Pass= passed      Fail = failed      N/A= not applicable      EUT= equipment, sample(s) under tested                        |                                                                                                                                                                                |                                                                                                                                                   |                               |

This test report relates only to the EUT, and shall not be reproduced except in full, without written approval of CVC.



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**RELEASE CONTROL RECORD**

| ISSUE NO.          | REASON FOR CHANGE | DATE ISSUED   |
|--------------------|-------------------|---------------|
| FCCSZ2025-0015-RF2 | Original release  | Apr. 25, 2025 |



## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 15, Subpart C Section 15.225 |                                            |        |                                |
|---------------------------------------------------------|--------------------------------------------|--------|--------------------------------|
| FCC STANDARD SECTION                                    | TEST TYPE AND LIMIT                        | RESULT | REMARK                         |
| 15.207                                                  | AC Power Line Conducted Emission           | PASS   | Meet the requirement of limit. |
| 15.225 (a)&(b)&(c)<br>15.205                            | The field strength of Fundamental Emission | PASS   | Meet the requirement of limit. |
| 15.225 (d)<br>15.209                                    | Radiated Emissions                         | PASS   | Meet the requirement of limit. |
| 15.225 (e)                                              | 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.  |

### 1.1 TEST LOCATION

The tests and measurements refer to this report were performed by EMC testing Lab of CVC Testing Technology (Shenzhen) Co., Ltd.

Address: No. 1301-14&16, Guanguang Road, Xinlan Community, Guanlan Subdistrict, Longhua District, Shenzhen, Guangdong, China

Post Code: 518110 Tel: 0755-23763060-8805

Fax: 0755-23763060 E-mail: sz-kf@cvc.org.cn

FCC(Test firm designation number: CN1363)

IC(Test firm CAB identifier number: CN0137)

CNAS(Test firm designation number: L16091)



## 1.2 LIST OF TEST AND MEASUREMENT INSTRUMENTS

| Equipment                                | Manufacturer  | Model No.          | Serial Number | Cal. interval | Cal. Due  |
|------------------------------------------|---------------|--------------------|---------------|---------------|-----------|
| Antenna Port Conducted Test              |               |                    |               |               |           |
| Signal&Spectrum Analyzer                 | Rohde&Schwarz | FSV 30             | 104408        | 1 year        | 2026/4/22 |
| #3Shielding room                         | MORI          | 443                | N/A           | 3 year        | 2026/5/16 |
| Wideband radio communication tester      | Rohde&Schwarz | CMW 500            | 168778        | 1 year        | 2025/5/24 |
| Analog signal Generator (100kHz ~ 40GHz) | Rohde&Schwarz | SMB 100A           | 181934        | 1 year        | 2026/4/22 |
| Vector signal Generator (9kHz ~ 6GHz)    | Rohde&Schwarz | SGT 100A           | 111724        | 1 year        | 2026/4/22 |
| RF control unit(BT/WiFi)                 | Tonscend      | JS0806-2-8CH       | CS0300023     | 1 year        | 2026/4/22 |
| Temperature and humidity meter           | /             | C193561457         | C193561457    | 1 year        | 2026/4/28 |
| Radiation Spurious Test - 3M Chamber #2  |               |                    |               |               |           |
| Signal&Spectrum Analyzer                 | Rohde&Schwarz | FSV 40             | 101898        | 1 year        | 2026/4/22 |
| EMI Test Receiver                        | Rohde&Schwarz | ESR3               | 102694        | 1 year        | 2025/5/24 |
| Antenna(30MHz~1001MHz)                   | SCHWARZBECK   | VULB 9168          | 01133         | 1 year        | 2026/1/22 |
| Horn antenna(1GHz-18GHz)                 | ETS           | 3117               | 227611        | 1 year        | 2026/3/28 |
| Horn antenna(18GHz-40GHz)                | QMS           | QMS-00880          | 22051         | 1 year        | 2026/3/21 |
| 3m anechoic chamber                      | MORI          | 966                | CS0300011     | 3 year        | 2026/5/18 |
| Filter group(RSE-BT/WiFi)                | Rohde&Schwarz | WiFi /BT Variant 1 | 100820        | 1 year        | 2026/4/22 |
| Filter group(RSE-Cellular)               | Rohde&Schwarz | Cellular Variant 1 | 100768        | 1 year        | 2026/4/22 |
| Preamplifier(10kHz-1GHz)                 | Rohde&Schwarz | SCU-01F            | 100299        | 1 year        | 2026/4/22 |
| Preamplifier(1GHz-18GHz)                 | Rohde&Schwarz | SCU-18F            | 100799        | 1 year        | 2026/4/22 |
| Preamplifier(1GHz-18GHz)                 | Rohde&Schwarz | SCU-18F            | 100801        | 1 year        | 2026/4/22 |
| Preamplifier(18GHz-40GHz)                | Rohde&Schwarz | SCU-40A            | 101209        | 1 year        | 2026/4/22 |
| Temperature and humidity meter           | /             | C193561517         | C193561517    | 1 year        | 2026/4/28 |
| Radiation Spurious Test - 3M Chamber #1  |               |                    |               |               |           |
| EMI Test Receiver                        | Rohde&Schwarz | ESR 26             | 101718        | 1 year        | 2025/5/24 |
| Loop antenna(8.3k~30MHz)                 | Rohde&Schwarz | HFH2-Z2E           | 100951        | 1 year        | 2025/6/3  |
| Antenna(30MHz~1000MHz)                   | SCHWARZBECK   | VULB 9168          | 01132         | 1 year        | 2026/2/27 |
| Horn antenna(1GHz-18GHz)                 | SCHWARZBECK   | BBHA9120D          | 02793         | 1 year        | 2026/1/20 |
| 3m anechoic chamber                      | MORI          | 966                | N/A           | 1 year        | 2026/5/18 |
| Preamplifier(10kHz-1GHz)                 | Rohde&Schwarz | SCU-01F            | 100298        | 1 year        | 2026/4/22 |
| Preamplifier(1GHz-18GHz)                 | Rohde&Schwarz | SCU-18F            | 100799        | 1 year        | 2026/4/22 |
| Attenuator                               | /             | SJ-5dB             | 607684        | 1 year        | 2026/2/27 |
| #1 control room                          | MORI          | 433                | /             | 1 year        | 2026/5/16 |
| Temperature and humidity meter           | /             | C193561473         | C193561473    | 1 year        | 2026/4/28 |
| Conducted emission                       |               |                    |               |               |           |
| EMI Test Receiver                        | Rohde&Schwarz | ESR3               | 102693        | 1 year        | 2025/5/24 |
| limiter(10 dB)                           | Rohde&Schwarz | VTSD 9561          | 01216         | 1 year        | 2026/4/22 |
| Voltage probe                            | Rohde&Schwarz | CVP9222C           | 00028         | 1 year        | 2026/4/28 |
| Current probe                            | Rohde&Schwarz | EZ-17              | 101442        | 1 year        | 2026/4/22 |
| ISN network                              | Rohde&Schwarz | ENV 81             | 100401        | 1 year        | 2026/4/22 |
| ISN network                              | Rohde&Schwarz | ENV 81 Cat6        | 101896        | 1 year        | 2026/4/22 |
| #1Shielding room                         | MORI          | 854                | N/A           | 3 year        | 2026/5/16 |
| LISN                                     | SCHWARZBECK   | NSLK 8129          | 05021         | 1 year        | 2026/4/22 |
| Temperature and humidity meter           | /             | C193561430         | C193561430    | 1 year        | 2026/4/28 |

## 1.3 MEASUREMENT UNCERTAINTY

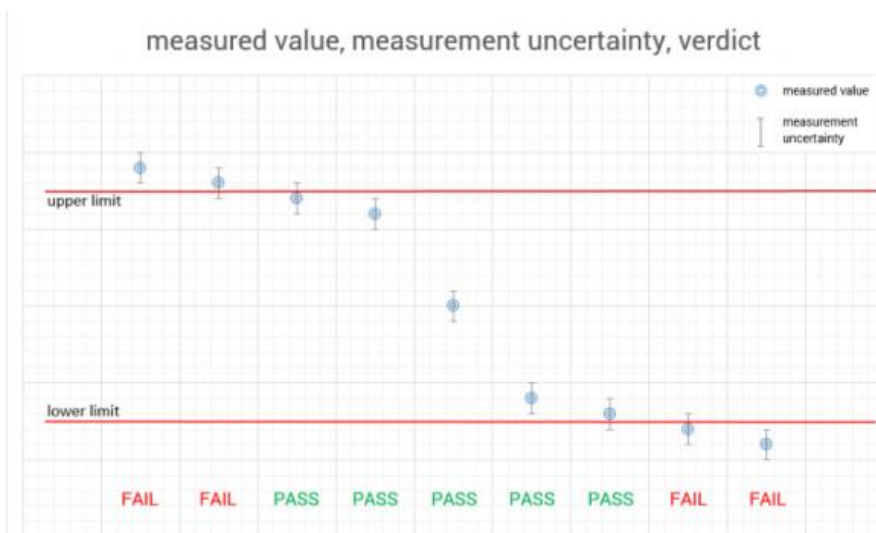
Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| No.                                 | Item                              | Measurement Uncertainty |
|-------------------------------------|-----------------------------------|-------------------------|
| 1                                   | Occupied Channel Bandwidth        | $\pm 1.86$ %            |
| 2                                   | RF output power, conducted        | $\pm 0.9$ dB            |
| 3                                   | Power Spectral Density, conducted | $\pm 0.8$ dB            |
| 4                                   | Conducted emission test           | $\pm 2.7$ dB            |
| 5                                   | Radiated emission 9kHz-30MHz      | $\pm 5.6$ dB            |
|                                     | Radiated emission 30MHz-1GHz      | $\pm 4.6$ dB            |
|                                     | Radiated emission 1GHz-18GHz      | $\pm 4.4$ dB            |
|                                     | Radiated emission 18GHz-40GHz     | $\pm 5.1$ dB            |
| 6                                   | Temperature                       | $\pm 0.73$ °C           |
| 7                                   | Humidity                          | $\pm 3.90$ %            |
| 8                                   | Supply voltages                   | $\pm 0.37$ %            |
| 9                                   | Time                              | $\pm 0.27$ %            |
| Remark: 95% Confidence Levels, k=2. |                                   |                         |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed.

The measurement uncertainty is mentioned in this test report, but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong.





## 2 GENERAL INFORMATION

### 2.1 GENERAL PRODUCT INFORMATION

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| PRODUCT NAME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Solar powered E-lock                                         |
| BRAND NAME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | TOPFLYtech                                                   |
| MODEL NAME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | SolarGuardX 110                                              |
| ADDITIONAL MODEL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A                                                          |
| POWER SUPPLY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1. DC 5V from USB host<br>2. DC 3.6V from Li-Polymer battery |
| MODULATION TYPE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ASK                                                          |
| OPERATING FREQUENCY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 13.56MHz                                                     |
| NUMBER OF CHANNEL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                            |
| ANTENNA TYPE (Remark 4/5)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Loop antenna                                                 |
| I/O PORTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Refer to user's manual                                       |
| CABLE SUPPLIED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Single-ended charging cable, 60cm                            |
| Remark:<br><ol style="list-style-type: none"><li>For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.</li><li>For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.</li><li>EUT photo refer to the report (Report NO.: FCCSZ2024-0006-EUT).</li><li>Please refer to the antenna report.</li><li>Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information, CVC is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.</li></ol> |                                                              |

### 2.2 DESCRIPTION OF ACCESSORIES

N/A

### 2.3 OPERATING FREQUENCY

The EUT only have one channel.

| CHANNEL | FREQUENCY (MHz) |
|---------|-----------------|
| 1       | 13.56           |





## 2.4 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports

The worst case was found when positioned on X axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

| EUT CONFIGURE<br>MODE | APPLICABLE TO |    |     |    | DESCRIPTION |
|-----------------------|---------------|----|-----|----|-------------|
|                       | RE            | FT | PLC | BW |             |
| A                     | √             | √  | √   | √  | NFC Link    |

Where RE: Radiated Emission

FT: Frequency tolerance

PLC: Power Line Conducted Emission

BW: 20dB Bandwidth

### RADIATED EMISSION TEST:

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

| EUT<br>CONFIGURE<br>MODE | TESTED CHANNEL | TESTED FREQUENCY<br>(MHZ) | MODULATION TYPE | AXIS |
|--------------------------|----------------|---------------------------|-----------------|------|
| A                        | 1              | 13.56                     | ASK             | X    |
|                          | 1              | 13.56                     | ASK             | Y    |
|                          | 1              | 13.56                     | ASK             | Z    |

### FREQUENCY TOLERANCE:

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT<br>CONFIGURE<br>MODE | TESTED CHANNEL | TESTED FREQUENCY<br>(MHZ) | MODULATION TYPE | AXIS |
|--------------------------|----------------|---------------------------|-----------------|------|
| A                        | 1              | 13.56                     | ASK             | Y    |



## **POWER LINE CONDUCTED EMISSION TEST:**

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | TESTED CONDITION |
|--------------------|------------------|
| A                  | NFC Link         |

## **20dB BANDWIDTH:**

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | TESTED CHANNEL | TESTED FREQUENCY (MHZ) | MODULATION TYPE | AXIS |
|--------------------|----------------|------------------------|-----------------|------|
| A                  | 1              | 13.56                  | ASK             | Y    |

## **TEST CONDITION:**

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | TEST VOLTAGE (SYSTEM) | TESTED BY |
|---------------|--------------------------|-----------------------|-----------|
| RE            | 25.5deg. C, 56%RH        | DC 5V from USB host   | Liu Yuan  |
| FT            | 25.5deg. C, 56%RH        | DC 5V from USB host   | Zhu Yulin |
| PLC           | 25.5deg. C, 56%RH        | DC 5V from USB host   | Zhu Yulin |
| BW            | 25.5deg. C, 56%RH        | DC 5V from USB host   | Zhu Yulin |



## 2.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

**FCC PART 15, Subpart C. Section 15.225**

**ANSI C63.10-2020**

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

## 2.6 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.

Training and tests:

| Support Equipment |             |                   |            |                      |                    |                |             |
|-------------------|-------------|-------------------|------------|----------------------|--------------------|----------------|-------------|
| NO                | Description | Brand             | Model No.  | Serial Number        | Supplied by        |                |             |
| 1                 | Adapter     | Apple             | A1443      | N/A                  | Lab                |                |             |
|                   |             |                   |            |                      |                    |                |             |
| Support Cable     |             |                   |            |                      |                    |                |             |
| NO                | Description | Quantity (Number) | Length (m) | Detachable (Yes/ No) | Shielded (Yes/ No) | Cores (Number) | Supplied by |
| 1                 | USB cable   | 1                 | 0.8        | No                   | No                 | N/A            | Lab         |
|                   |             |                   |            |                      |                    |                |             |

## 3 TEST TYPES AND RESULTS

### 3.1 CONDUCTED EMISSION MEASUREMENT

#### 3.1.1 Limits

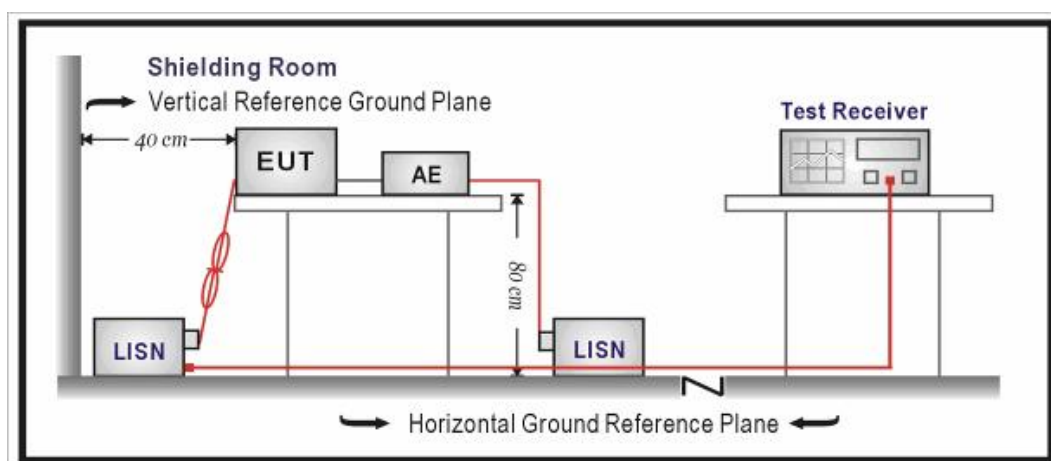
| Frequency<br>(MHz) | Conducted Limits(dBμV) |           |
|--------------------|------------------------|-----------|
|                    | Quasi-peak             | Average   |
| 0.15 - 0.5         | 66 to 56 *             | 56 to 46* |
| 0.5 - 5            | 56                     | 46        |
| 5 - 30             | 60                     | 50        |

NOTE: 1. The lower limit shall apply at the transition frequencies.  
NOTE: 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

#### 3.1.2 Test Procedures

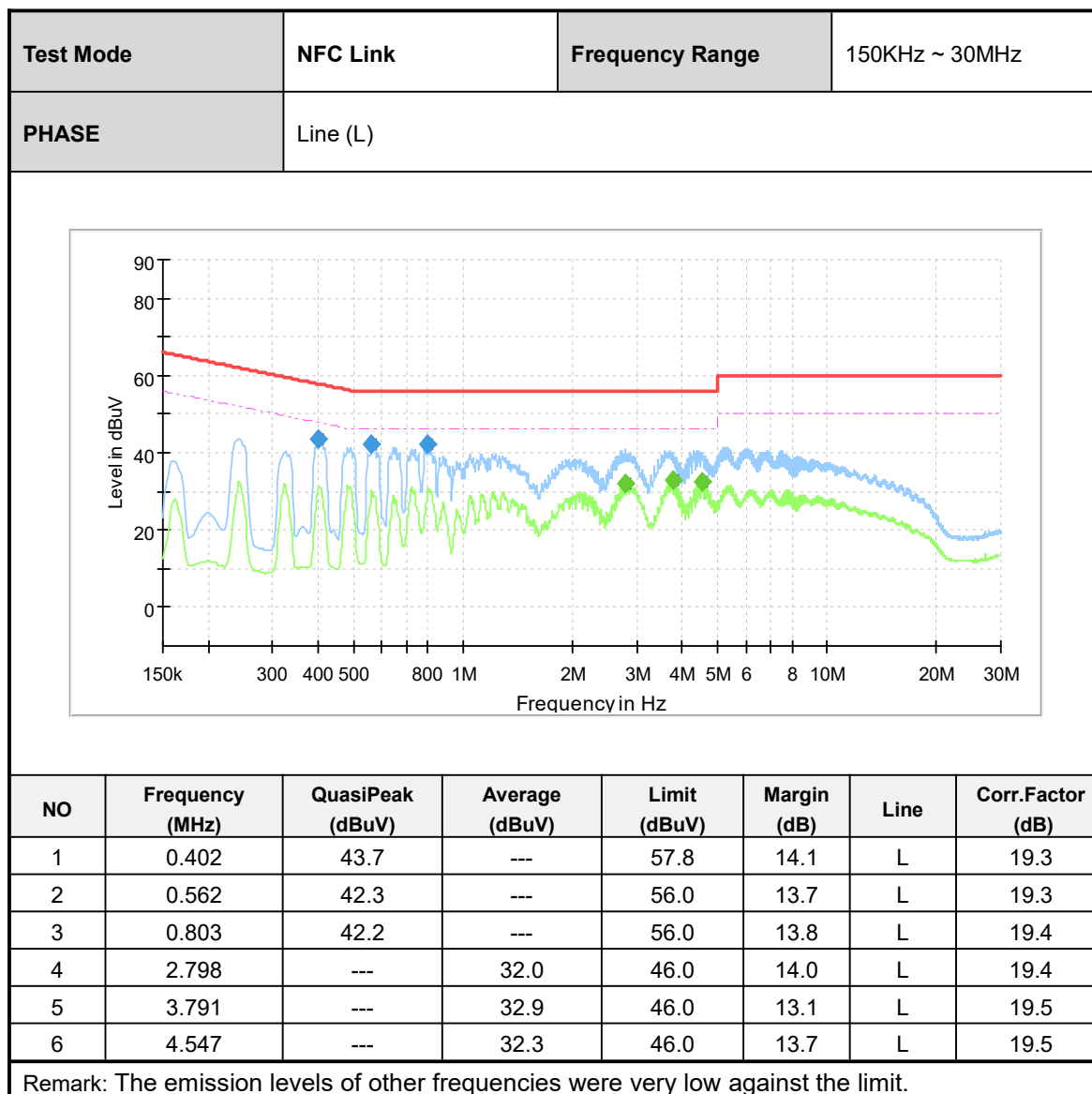
- The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the Test photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source. The equipment under test shall be placed on a support of non-metallic material, the height of which shall be 1.5m above the ground,
- The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
- Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

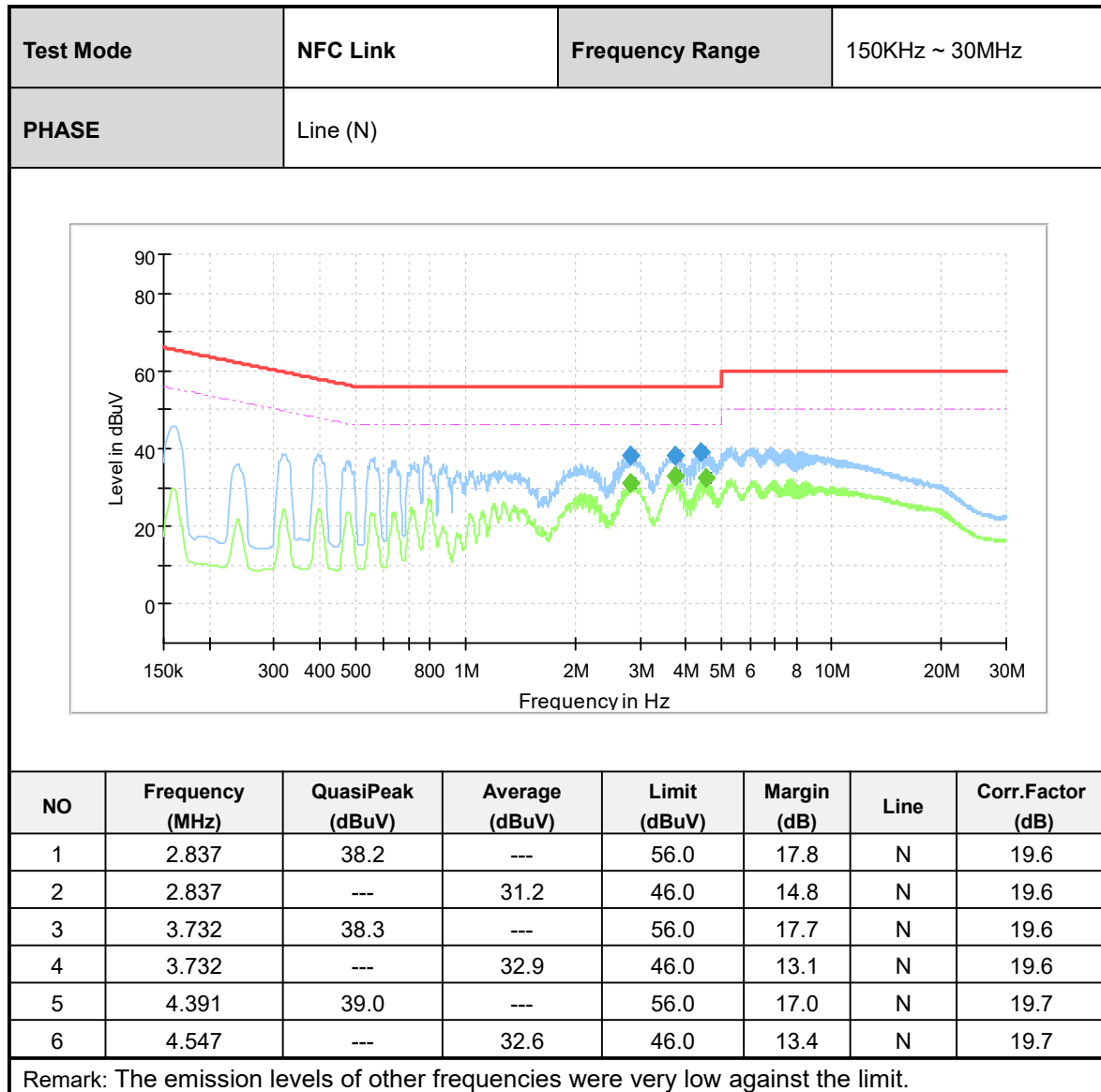
#### 3.1.3 Test setup





## 3.1.4 Test Results







## 3.2 RADIATED EMISSIONS MEASUREMENT

### 3.2.1 Limits

- (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.

| FREQUENCIES (MHz) | FIELD STRENGTH<br>(Microvolts/Meter) | MEASUREMENT DISTANCE<br>(Meters) |
|-------------------|--------------------------------------|----------------------------------|
| 0.009 ~ 0.490     | $2400/F(\text{kHz})$                 | 300                              |
| 0.490 ~ 1.705     | $24000/F(\text{kHz})$                | 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.  
NOTE: 2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

### 3.2.2 Measurement procedure

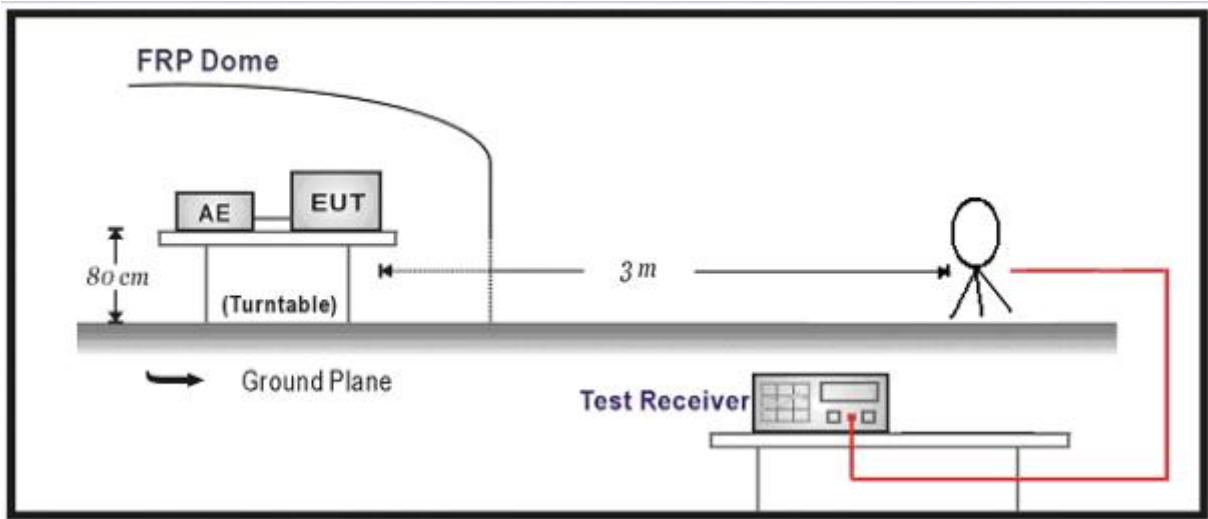
- The EUT was placed on the top of a rotating table 1.5 meters (above 1GHz) and 0.8 meters (below 1GHz) above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- For below 1GHz was used bilog antenna, and above 1GHz was used horn antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 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.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- For below 30MHz, a loop antenna with its vertical plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.
- During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables. For battery operated equipment, the equipment tests shall be performed using fresh batteries. The turntable was rotated to maximize the emission level.

**NOTE:**

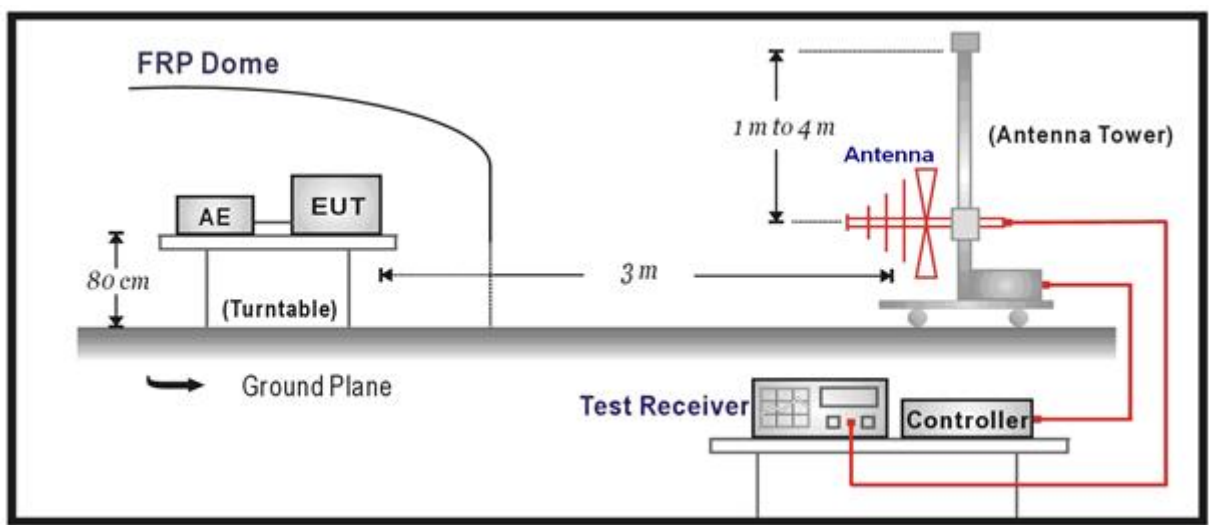
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) or 10Hz (Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The testing of the EUT was performed on all 3 orthogonal axes; the worst-case test configuration was reported on the file test setup photo.

### 3.2.3 Test setup

Below 30MHz Test Setup:



Below 1GHz Test Setup:

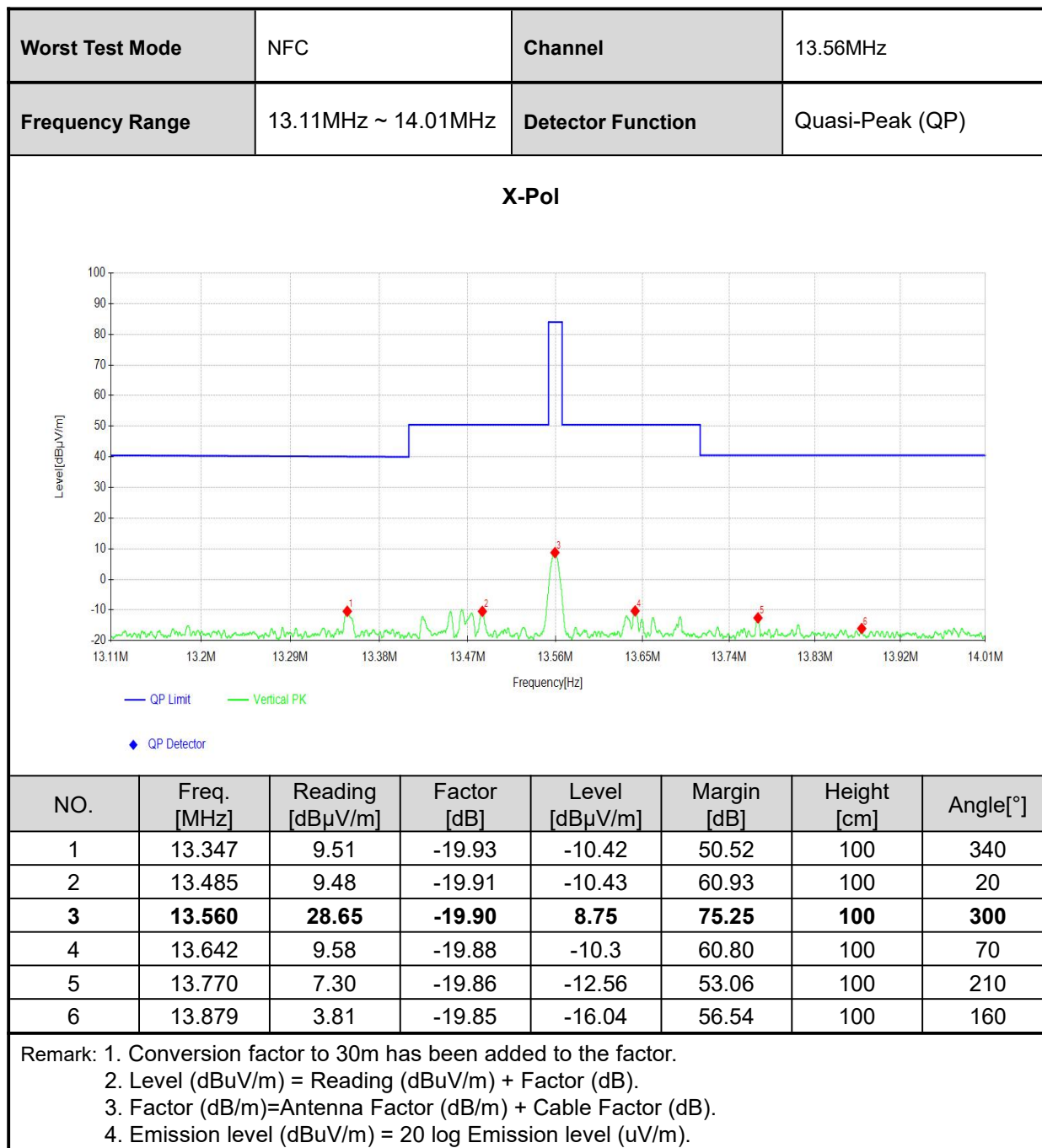


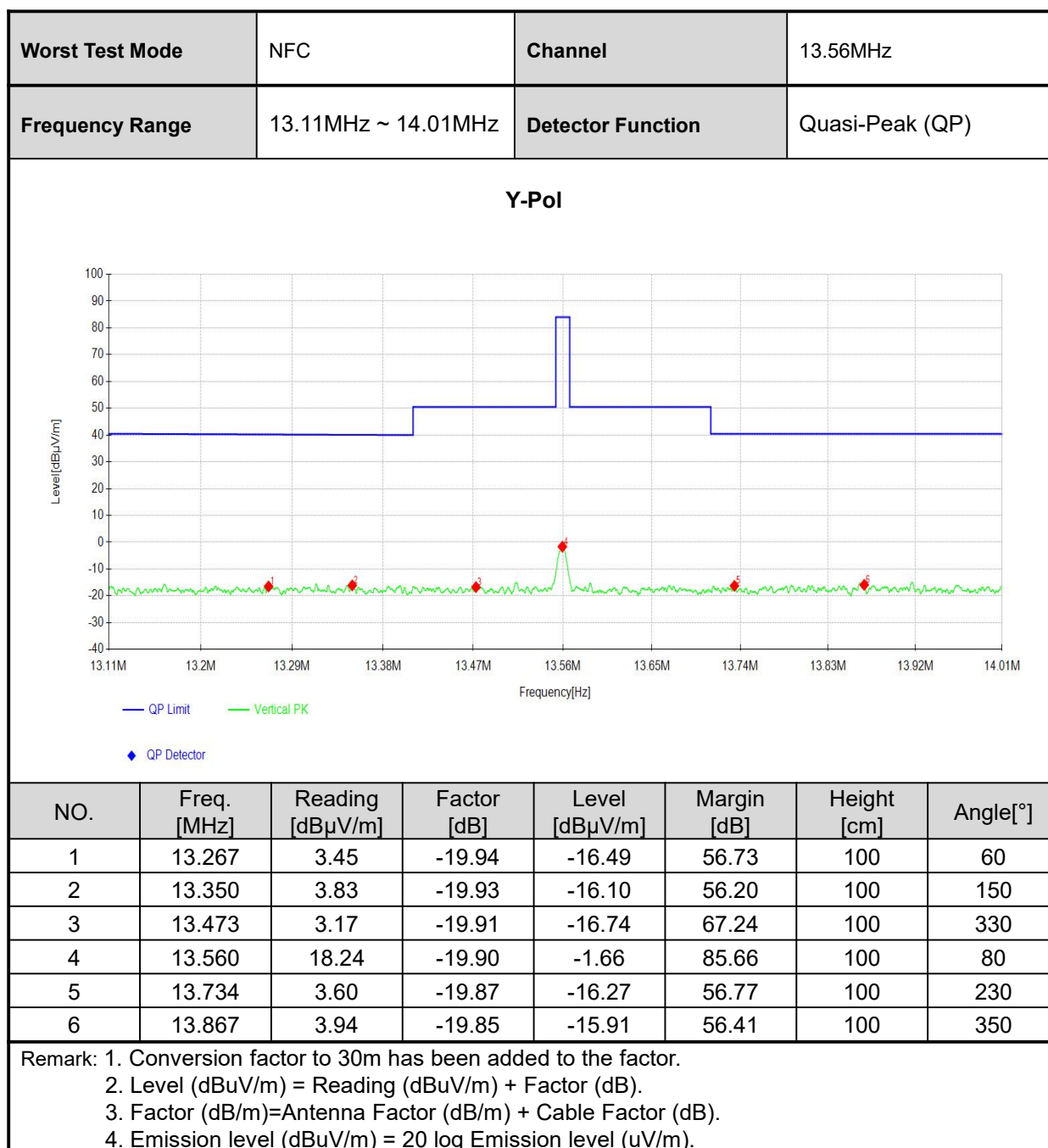


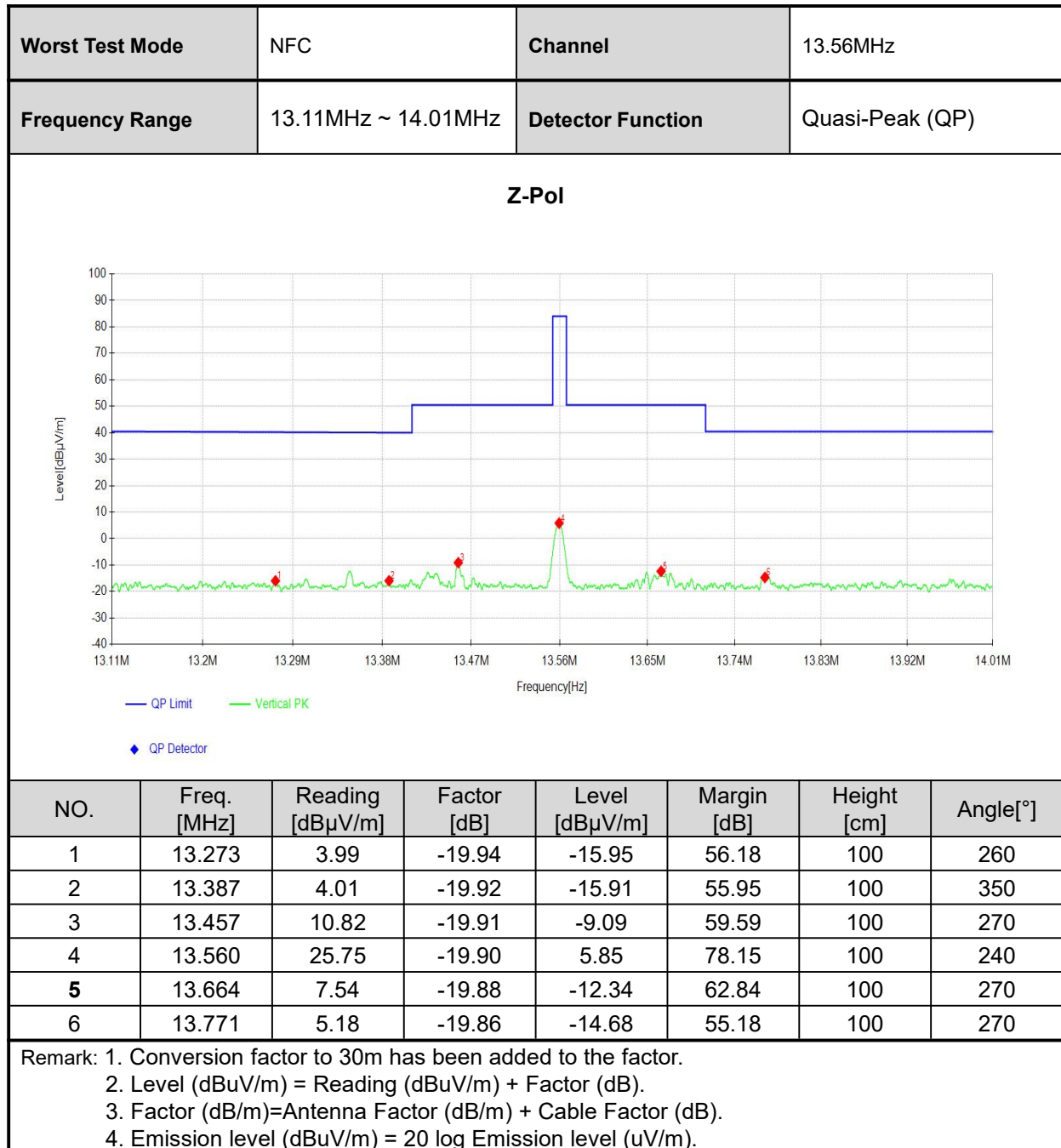


## 3.2.4 Test results

Result of The field strength of Fundamental Emission





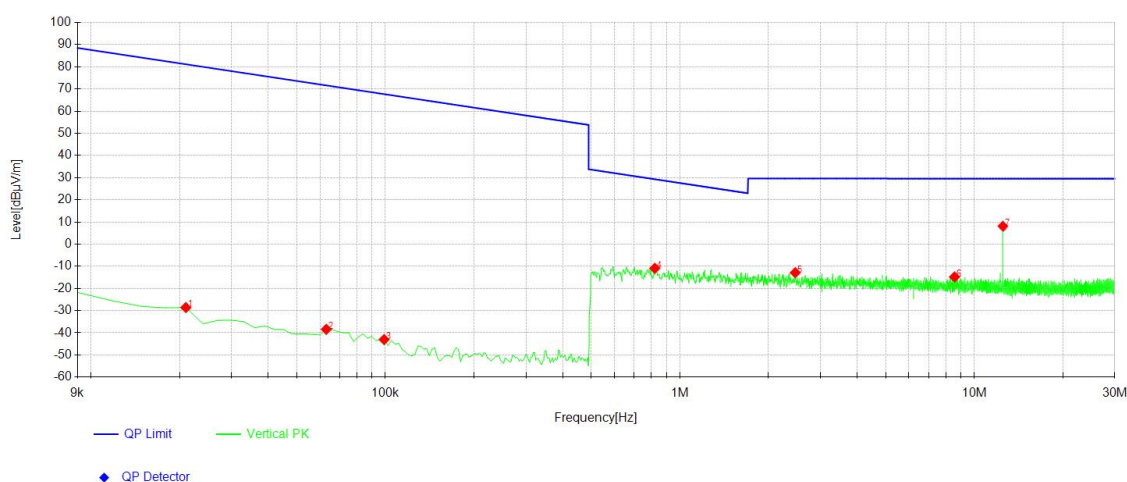




## Result of Radiated Emissions(9kHz~30MHz)

|                 |              |                   |                 |
|-----------------|--------------|-------------------|-----------------|
| Worst Test Mode | NFC          | Channel           | 13.56MHz        |
| Frequency Range | 9kHz ~ 30MHz | Detector Function | Quasi-Peak (QP) |

### X-Pol



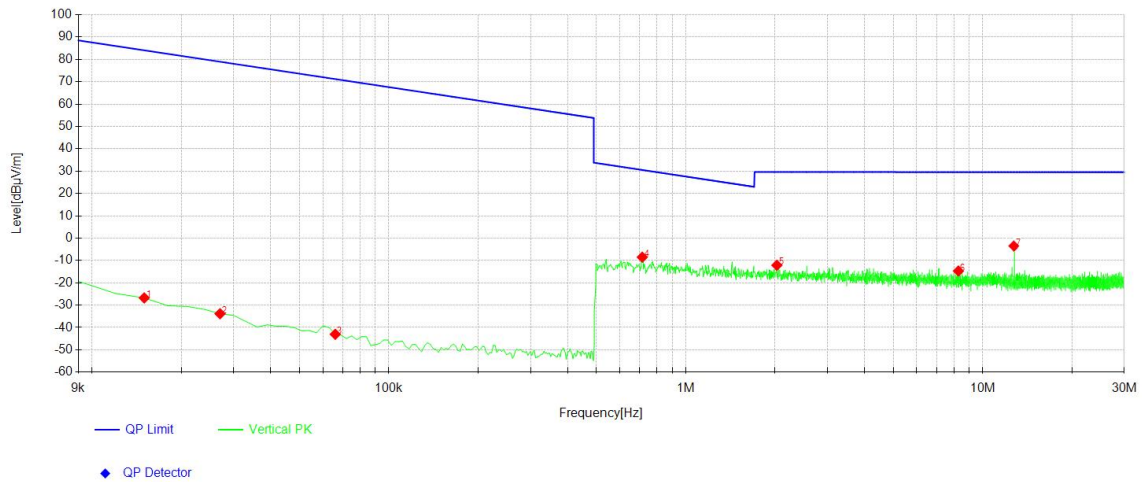
| NO. | Freq. [MHz] | Reading [dBuV/m] | Factor [dB] | Level [dBuV/m] | Margin [dB] | Height [cm] | Angle[°] |
|-----|-------------|------------------|-------------|----------------|-------------|-------------|----------|
| 1   | 0.021       | 30.71            | -59.31      | -28.6          | 109.76      | 100         | 10       |
| 2   | 0.063       | 20.77            | -59.21      | -38.44         | 110.06      | 100         | 150      |
| 3   | 0.099       | 16.31            | -59.34      | -43.03         | 110.72      | 100         | 10       |
| 4   | 0.822       | 8.12             | -19.04      | -10.92         | 40.22       | 100         | 280      |
| 5   | 2.466       | 6.19             | -19.06      | -12.87         | 42.44       | 100         | 320      |
| 6   | 8.569       | 4.66             | -19.48      | -14.82         | 44.37       | 100         | 360      |
| 7   | 13.560      | 27.90            | -19.90      | 8.00           | 21.55       | 100         | 350      |

Remark: 1. Conversion factor to 30m has been added to the factor.  
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).  
3. Factor (dB/m)=Antenna Factor (dB/m) + Cable Factor (dB).  
4. Emission level (dBuV/m) = 20 log Emission level (uV/m).



|                 |              |                   |                 |
|-----------------|--------------|-------------------|-----------------|
| Worst Test Mode | NFC          | Channel           | 13.56MHz        |
| Frequency Range | 9kHz ~ 30MHz | Detector Function | Quasi-Peak (QP) |

Y-Pol



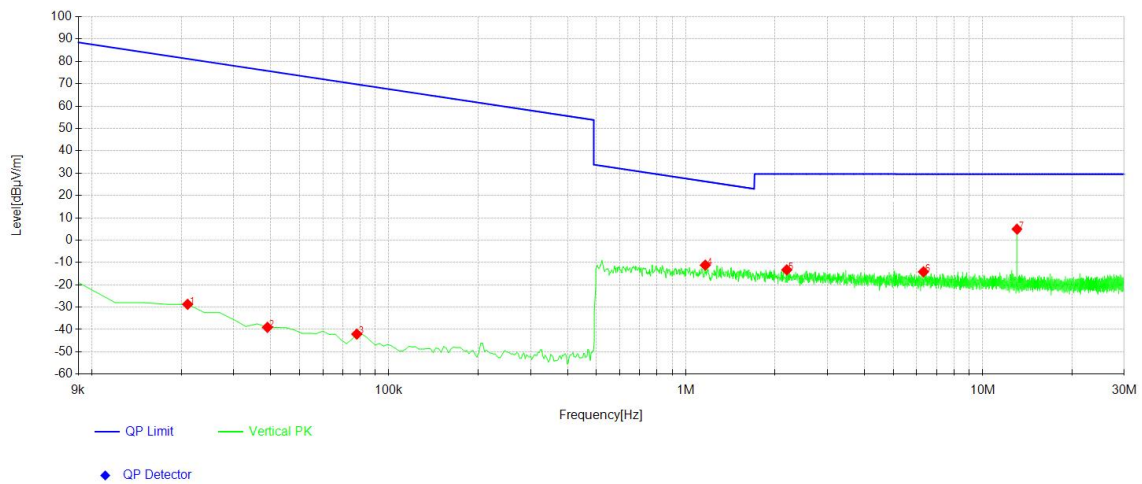
| NO. | Freq. [MHz] | Reading [dBμV/m] | Factor [dB] | Level [dBμV/m] | Margin [dB] | Height [cm] | Angle[°] |
|-----|-------------|------------------|-------------|----------------|-------------|-------------|----------|
| 1   | 0.012       | 34.79            | -59.45      | -24.66         | 110.68      | 100         | 2        |
| 2   | 0.084       | 14.90            | -59.41      | -44.51         | 113.63      | 100         | 348      |
| 3   | 0.216       | 11.36            | -59.47      | -48.11         | 109.03      | 100         | 3        |
| 4   | 1.230       | 8.71             | -19.19      | -10.48         | 36.27       | 100         | 302      |
| 5   | 2.690       | 6.37             | -19.03      | -12.66         | 42.23       | 100         | 158      |
| 6   | 5.153       | 5.64             | -19.23      | -13.59         | 43.15       | 100         | 170      |
| 7   | 13.560      | 17.72            | -19.90      | -2.18          | 19.35       | 100         | 120      |

Remark: 1. Conversion factor to 30m has been added to the factor.  
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).  
3. Factor (dB/m)=Antenna Factor (dB/m) + Cable Factor (dB).  
4. Emission level (dBuV/m) = 20 log Emission level (uV/m).



|                 |              |                   |                 |
|-----------------|--------------|-------------------|-----------------|
| Worst Test Mode | NFC          | Channel           | 13.56MHz        |
| Frequency Range | 9kHz ~ 30MHz | Detector Function | Quasi-Peak (QP) |

## Z-Pol



| NO. | Freq. [MHz] | Reading [dBμV/m] | Factor [dB] | Level [dBμV/m] | Margin [dB] | Height [cm] | Angle[°] |
|-----|-------------|------------------|-------------|----------------|-------------|-------------|----------|
| 1   | 0.021       | 30.58            | -59.31      | -18.32         | 109.89      | 100         | 70       |
| 2   | 0.039       | 20.11            | -59.14      | -39.48         | 114.81      | 100         | 340      |
| 3   | 0.078       | 17.29            | -59.35      | -45.87         | 111.82      | 100         | 320      |
| 4   | 1.164       | 7.99             | -19.19      | -9.83          | 37.47       | 100         | 30       |
| 5   | 2.190       | 5.78             | -19.08      | -12.19         | 42.87       | 100         | 110      |
| 6   | 6.320       | 5.14             | -19.32      | -13.33         | 43.74       | 100         | 70       |
| 7   | 13.560      | 26.26            | -19.90      | 6.36           | 15.19       | 100         | 80       |

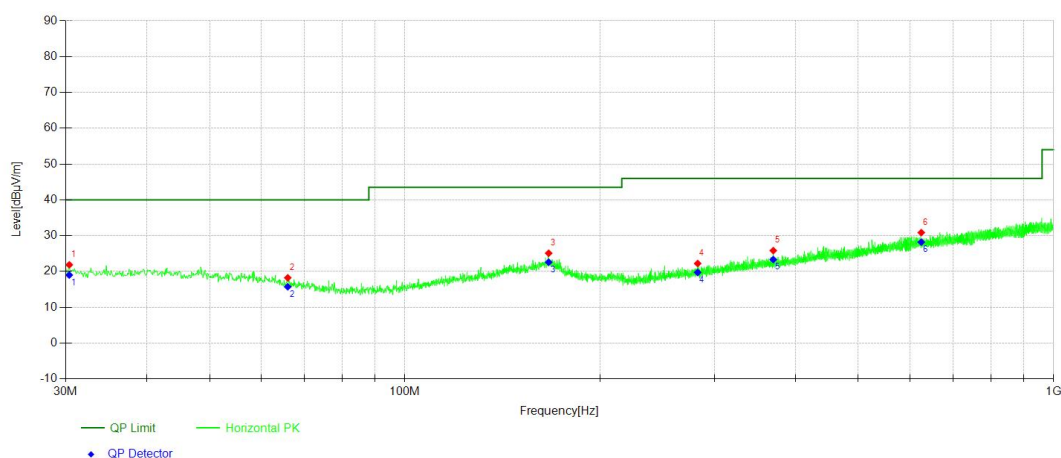
Remark: 1. Conversion factor to 30m has been added to the factor.  
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).  
3. Factor (dB/m)=Antenna Factor (dB/m) + Cable Factor (dB).  
4. Emission level (dBuV/m) = 20 log Emission level (uV/m).



## Result of Radiated Emissions(30MHz~1GHz)

|                 |              |                   |                 |
|-----------------|--------------|-------------------|-----------------|
| Worst Test Mode | NFC          | Channel           | 13.56MHz        |
| Frequency Range | 30MHz ~ 1GHz | Detector Function | Quasi-Peak (QP) |

### Horizontal



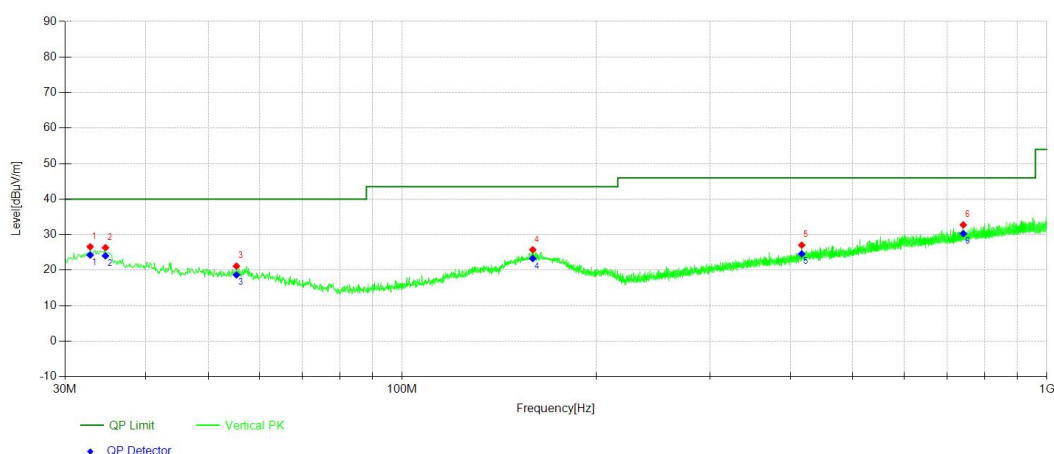
| NO. | Freq. [MHz] | Level [dBuV/m] | Reading [dBuV] | Factor [dB/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-------------|----------------|----------------|---------------|----------------|-------------|-------------|-----------|
| 1   | 34.37       | 22.59          | 3.06           | 19.53         | 40.00          | 17.41       | 100         | 358       |
| 2   | 65.31       | 19.27          | 1.15           | 18.12         | 40.00          | 20.73       | 100         | 358       |
| 3   | 169.01      | 25.54          | 5.16           | 20.38         | 43.50          | 17.96       | 100         | 15        |
| 4   | 444.91      | 29.37          | 4.37           | 25.00         | 46.00          | 16.63       | 100         | 358       |
| 5   | 593.34      | 35.05          | 7.10           | 27.95         | 46.00          | 10.95       | 100         | 358       |
| 6   | 889.99      | 38.51          | 6.23           | 32.28         | 46.00          | 7.49        | 100         | 358       |

Remark: 1. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).  
2. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
3. Margin(dB) = Limit[dBuV/m] - Level [dBuV/m]  
4. Emission level (dBuV/m) = 20 log Emission level (uV/m).



|                 |              |                   |                 |
|-----------------|--------------|-------------------|-----------------|
| Worst Test Mode | NFC          | Channel           | 13.56MHz        |
| Frequency Range | 30MHz ~ 1GHz | Detector Function | Quasi-Peak (QP) |

## Vertical



| NO | Freq. [MHz] | Level [dBuV/m] | Reading [dBuV] | Factor [dB/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [°] |
|----|-------------|----------------|----------------|---------------|----------------|-------------|-------------|-----------|
| 1  | 32.81       | 26.58          | 7.1            | 19.460        | 40.00          | 13.42       | 100         | 29        |
| 2  | 34.66       | 26.34          | 6.8            | 19.550        | 40.00          | 13.66       | 200         | 358       |
| 3  | 55.32       | 21.14          | 1.7            | 19.420        | 40.00          | 18.86       | 200         | 242       |
| 4  | 159.41      | 25.74          | 4.6            | 21.140        | 43.50          | 17.76       | 100         | 149       |
| 5  | 416.58      | 27.05          | 3.0            | 24.100        | 46.00          | 18.95       | 200         | 84        |
| 6  | 741.66      | 32.75          | 2.3            | 30.420        | 46.00          | 13.25       | 100         | 227       |

Remark: 1. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).  
2. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
3. Margin(dB) = Limit[dBuV/m] - Level [dBuV/m]  
4. Emission level (dBuV/m) = 20 log Emission level (uV/m).



### 3.3 FREQUENCY TOLERANCE

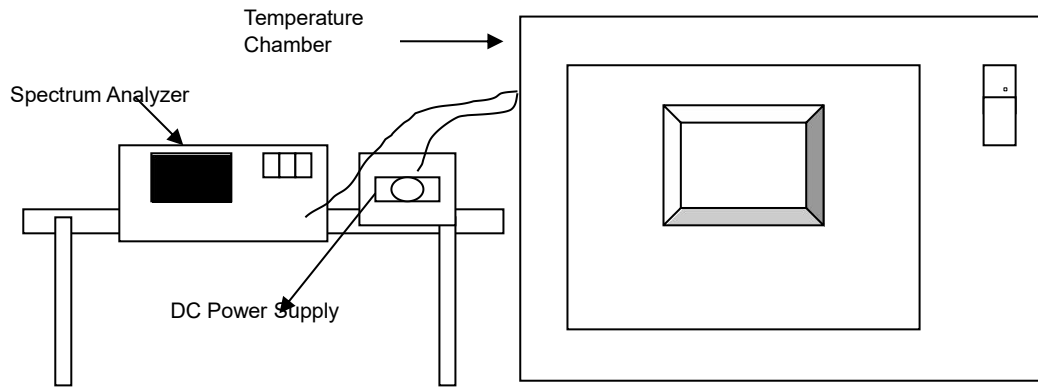
#### 3.3.1 LIMIT OF FREQUENCY TOLERANCE

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  (100ppm) 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. For battery operated equipment, the equipment tests shall be performed using a new battery.

#### 3.3.2 TEST PROCEDURES

Refer to ANSI C63.10-2020

#### 3.3.3 TEST SETUP





## 3.3.4 TEST RESULTS

| FREQUENCY STABILITY VERSUS TEMP. |                        |                                |                             |                                |                             |                                |                             |                                |                             |
|----------------------------------|------------------------|--------------------------------|-----------------------------|--------------------------------|-----------------------------|--------------------------------|-----------------------------|--------------------------------|-----------------------------|
| TEMP.<br>(°C)                    | POWER<br>SUPPLY<br>(V) | 0 MINUTE                       |                             | 2 MINUTE                       |                             | 5 MINUTE                       |                             | 10 MINUTE                      |                             |
|                                  |                        | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(ppm) | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(ppm) | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(ppm) | Measured<br>Frequency<br>(MHz) | Frequency<br>Drift<br>(ppm) |
| 50                               | 5                      | 13.55992                       | -5.90                       | 13.55990                       | -7.37                       | 13.55991                       | -6.64                       | 13.55996                       | -2.95                       |
| 40                               | 5                      | 13.55997                       | -2.21                       | 13.55992                       | -5.90                       | 13.55993                       | -5.16                       | 13.55995                       | -3.69                       |
| 30                               | 5                      | 13.55989                       | -8.11                       | 13.55991                       | -6.64                       | 13.55989                       | -8.11                       | 13.55996                       | -2.95                       |
| 20                               | 5                      | 13.55991                       | -6.64                       | 13.55996                       | -2.95                       | 13.55989                       | -8.11                       | 13.55992                       | -5.90                       |
| 10                               | 5                      | 13.55994                       | -4.42                       | 13.55990                       | -7.37                       | 13.55994                       | -4.42                       | 13.55994                       | -4.42                       |
| 0                                | 5                      | 13.55993                       | -5.16                       | 13.55989                       | -8.11                       | 13.55996                       | -2.95                       | 13.55996                       | -2.95                       |
| -10                              | 5                      | 13.55994                       | -4.42                       | 13.55989                       | -8.11                       | 13.55995                       | -3.69                       | 13.55993                       | -5.16                       |
| -20                              | 5                      | 13.55988                       | -8.85                       | 13.55992                       | -5.90                       | 13.55987                       | -9.59                       | 13.55995                       | -3.69                       |
| 20                               | 4.5                    | 13.55993                       | -5.16                       | 13.55996                       | -2.95                       | 13.55991                       | -6.64                       | 13.55990                       | -7.37                       |
|                                  | 5.5                    | 13.55995                       | -3.69                       | 13.55991                       | -6.64                       | 13.55990                       | -7.37                       | 13.55987                       | -9.59                       |



## 3.4 20dB BANDWIDTH

### 3.4.1 LIMITS OF 20dB BANDWIDTH

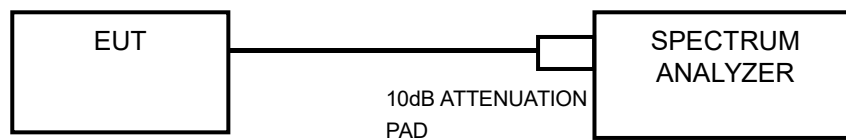
The 20dB bandwidth shall be specified in operating frequency band. (13.11MHz – 14.01MHz)

### 3.4.2 TEST PROCEDURE

- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- The resolution bandwidth of 1kHz and the video bandwidth of 3kHz were used.
- Measured spectrum width with power higher than 20dB below carrier.

Note: Because the measured signal is CW or CW-like adjust the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately the RBW

### 3.4.3 TEST SETUP

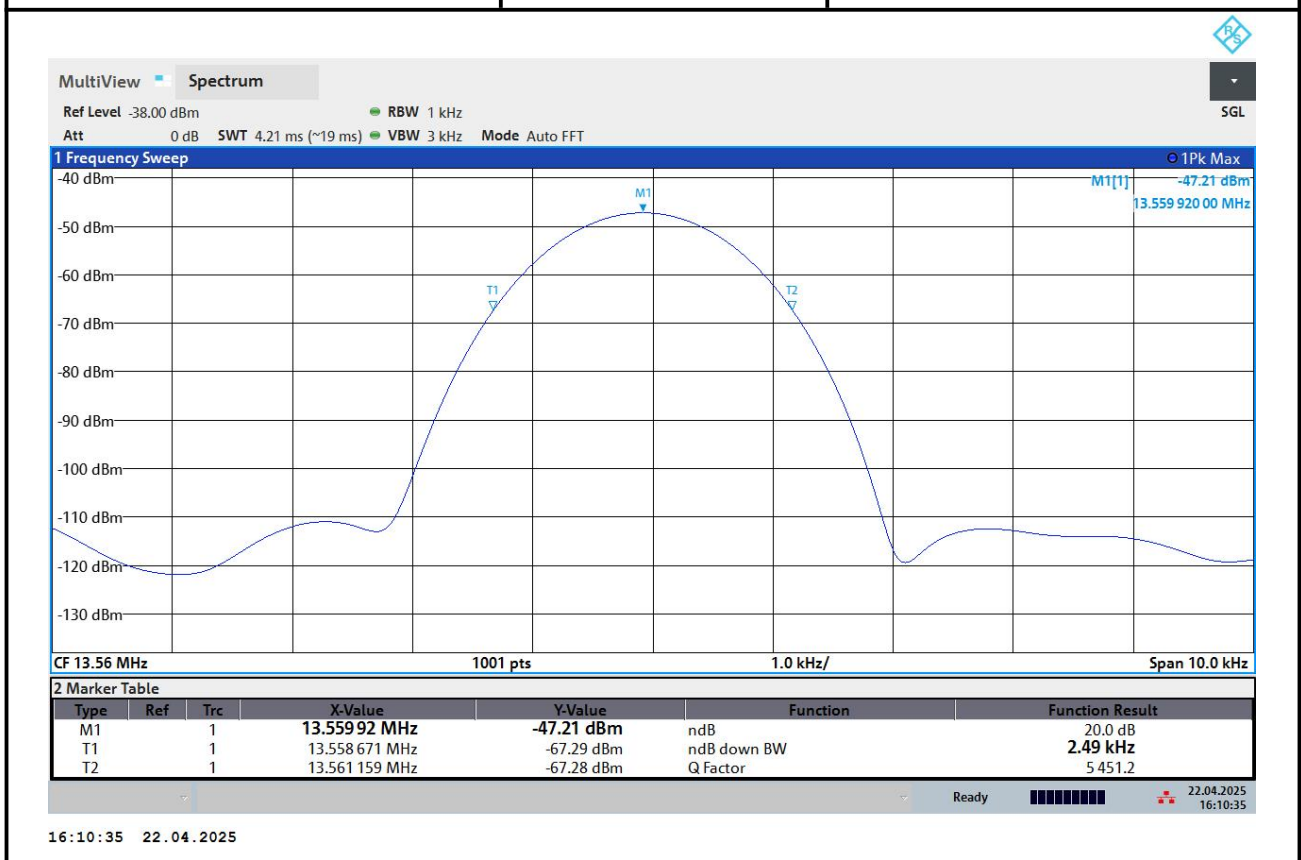




## 3.4.4 TEST RESULTS

| CHANNEL | CHANNEL FREQUENCY (MHz) | 20dB BANDWIDTH (kHz) |
|---------|-------------------------|----------------------|
| 1       | 13.56                   | 2.49                 |

| Lower & Upper Test Frequency Point (MHz) | Test Frequency (MHz) | P/F  |
|------------------------------------------|----------------------|------|
| Lower                                    | 13.5587              | PASS |
| Upper                                    | 13.5612              | PASS |





## **4 PHOTOGRAPHS OF TEST SETUP**

Please refer to the attached file (Test Photos).



## **5 PHOTOGRAPHS OF THE EUT**

Please refer to the attached file (External Photos report and Internal Photos).

**----- End of the Report -----**



## Important

- (1) The test report is invalid without the official stamp of CVC;
- (2) Any part photocopies of the test report are forbidden without the written permission from CVC;
- (3) The test report is invalid without the signatures of Approval and Reviewer;
- (4) The test report is invalid if altered;
- (5) Objections to the test report must be submitted to CVC within 15 days.
- (6) Generally, commission test is responsible for the tested samples only.
- (7) As for the test result “-” or “N” means “not applicable”, “/” means “not test”, “P” means “pass” and “F” means “fail”

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<http://www.cvc.org.cn>