

## TEST REPORT

### FCC Rules Part 15.225

**Report Reference No.....: MTEB22120067**

**FCC ID..... : 2A397-HS520M**

Compiled by

( position+printed name+signature)..: File administrators Alisa Luo



Supervised by

( position+printed name+signature)..: Test Engineer Sunny Deng



Approved by

( position+printed name+signature)..: Manager Yvette Zhou



Date of issue.....: **February 10, 2023**

**Representative Laboratory Name ..: Shenzhen Most Technology Service Co., Ltd.**

Address .....: No.5, 2nd Langshan Road, North District, Hi-tech Industrial Park,  
Nanshan, Shenzhen, Guangdong, China.

**Applicant's name.....: QINGDAO HISTONE INTELLIGENT COMMERCIAL SYSTEM CO., LTD.**

Address .....: Wisdom Valley, No.8 Shengshui Road, Laoshan District, Qingdao  
City, China

**Test specification/ Standard .....: FCC Rules Part 15.225**

TRF Originator.....: Shenzhen Most Technology Service Co., Ltd.

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**Test item description .....: Self-Checkout Terminal**

Trade Mark .....: Histone

Manufacturer .....: QINGDAO HISTONE INTELLIGENT COMMERCIAL SYSTEM CO., LTD.

Model/Type reference.....: HS520M

Listed Models .....: N/A

Modulation Type.....: ASK

Operation Frequency.....: 13.56MHz

Hardware Version.....: HS-KBLU

Software Version .....: HSKBU

Rating .....: 100-120V~/200-240V~, 50/60Hz, 3A/1.7A

Result.....: **PASS**

**TEST REPORT**

Equipment under Test : Self-Checkout Terminal

Model /Type : HS520M

Listed Models : N/A

Remark : N/A

Applicant : QINGDAO HISTONE INTELLIGENT COMMERCIAL SYSTEM CO., LTD.

Address : Wisdom Valley, No.8 Shengshui Road, Laoshan District, Qingdao City, China

Manufacturer : QINGDAO HISTONE INTELLIGENT COMMERCIAL SYSTEM CO., LTD.

Address : Wisdom Valley, No.8 Shengshui Road, Laoshan District, Qingdao City, China

|                     |             |
|---------------------|-------------|
| <b>Test Result:</b> | <b>PASS</b> |
|---------------------|-------------|

The test report merely corresponds to the test sample.  
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. Revision History

| Revision | Issue Date | Revisions     | Revised By |
|----------|------------|---------------|------------|
| 00       | 2023-02-10 | Initial Issue | Alisa Luo  |
|          |            |               |            |
|          |            |               |            |

## **2. TEST STANDARDS**

The tests were performed according to following standards:

The tests were performed according to following standards:

**FCC Rules Part 15.225:** Operation within the band 13.110-14.010 MHz.

**ANSI C63.10:2013 :** American National Standard for Testing Unlicensed Wireless Devices

**ANSI C63.4: 2014:** –American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz  
Range of 9 kHz to 40GHz

### 3. SUMMARY

#### 3.1. General Remarks

|                                |   |            |
|--------------------------------|---|------------|
| Date of receipt of test sample | : | 2022.12.02 |
|                                |   |            |
| Testing commenced on           | : | 2022.12.03 |
|                                |   |            |
| Testing concluded on           | : | 2022.12.30 |

#### 3.2. Product Description

|                       |                                       |
|-----------------------|---------------------------------------|
| Product Name:         | Self-Checkout Terminal                |
| Model/Type reference: | HS520M                                |
| Power Supply:         | 100-120V~/200-240V~, 50/60Hz, 3A/1.7A |
| Testing sample ID:    | MT22110324-326                        |
| Modulation:           | ASK                                   |
| Operation frequency:  | 13.56MHZ                              |
| Channel number:       | 1 (declared by the client)            |

#### 3.3. Equipment Under Test

##### Power supply system utilised

|                      |   |                                                        |                                              |
|----------------------|---|--------------------------------------------------------|----------------------------------------------|
| Power supply voltage | : | <input type="radio"/> 230V / 50 Hz                     | <input checked="" type="radio"/> 120V / 60Hz |
|                      |   | <input type="radio"/> 12 V DC                          | <input type="radio"/> 24 V DC                |
|                      |   | <input type="radio"/> Other (specified in blank below) |                                              |

100-120V~/200-240V~,50/60Hz,3A/1.7A

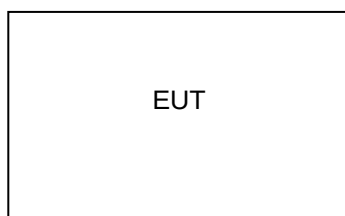
#### 3.4. Short description of the Equipment under Test (EUT)

This is a Self-Checkout Terminal For more details, refer to the user's manual of the EUT.

#### 3.5. EUT operation mode

| Channel | Freq.(MHz) | Note(Modulation Type) |
|---------|------------|-----------------------|
| 1       | 13.56MHz   | ASK                   |

#### 3.6. Block Diagram of Test Setup



**3.7. Test Item (Equipment Under Test) Description\***

| Short designation | EUT Name | EUT Description | Serial number | Hardware status | Software status |
|-------------------|----------|-----------------|---------------|-----------------|-----------------|
| EUT A             |          |                 | /             | /               | /               |
| EUT B             |          |                 | /             | /               | /               |
|                   |          |                 |               |                 |                 |

\*: declared by the applicant. According to customers information EUTs A and B are the same devices. Only the secondary screen size is different

**3.8. Auxiliary Equipment (AE) Description**

| AE short designation | EUT Name (if available) | EUT Description | Serial number (if available) | Software (if used) |
|----------------------|-------------------------|-----------------|------------------------------|--------------------|
| AE 1                 | /                       | /               | /                            | /                  |
| AE 2                 | -                       | /               | /                            | /                  |

**3.9 Antenna Information\***

| Short designation | Antenna Name | Antenna Type | Frequency Range | Serial number | Antenna Peak Gain |
|-------------------|--------------|--------------|-----------------|---------------|-------------------|
| Antenna 1         | ---          | /            | /               | ---           | /                 |
| Antenna 2         | /            | /            | /               | /             | /                 |
|                   |              |              |                 |               |                   |

\*: declared by the applicant.

### 3.10. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

○ - supplied by the manufacturer

● - Supplied by the lab

|                       |         |               |  |
|-----------------------|---------|---------------|--|
| <input type="radio"/> | ADAPTER | M/N:          |  |
| <input type="radio"/> |         | Manufacturer: |  |

### 3.11. Modifications

No modifications were implemented to meet testing criteria.

## 4. TEST ENVIRONMENT

### 4.1. Address of the test laboratory

**Shenzhen Most Technology Service Co., Ltd.**

No.5, 2nd Langshan Road, North District, Hi-tech Industrial Park, Nanshan, Shenzhen, Guangdong, China.  
The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

**Test Facility**

The test facility is recognized, certified, or accredited by the following organizations:

**FCC-Registration No.: 0031192610**

Shenzhen Most Technology Service Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

**A2LA-Lab Cert. No.: 6343.01**

Shenzhen Most Technology Service Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

### 4.2. Environmental conditions

Radiated Emission:

|                       |              |
|-----------------------|--------------|
| Temperature:          | 23 ° C       |
|                       |              |
| Humidity:             | 48 %         |
|                       |              |
| Atmospheric pressure: | 950-1050mbar |

Conducted testing:

|                       |              |
|-----------------------|--------------|
| Temperature:          | 24 ° C       |
|                       |              |
| Humidity:             | 45 %         |
|                       |              |
| Atmospheric pressure: | 950-1050mbar |

### 4.3. Test Description

| FCC and IC Requirements                     |                             |      |
|---------------------------------------------|-----------------------------|------|
| FCC Part 15.203                             | Antenna Requirement         | PASS |
| FCC Part 15.207                             | AC Power Conducted Emission | PASS |
| FCC Part 15.209&15.205 (a) &15.225(a,b,c,d) | Spurious Emissions          | PASS |
| FCC Part 15.215 (c) &15.225                 | 20dB Occupied Bandwidth     | PASS |
| FCC Part 15.225(e)                          | Frequency Tolerance         | PASS |

Remark:

1. The measurement uncertainty is not included in the test result.
2. NA = Not Applicable; NP = Not Performed

### 4.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Most Technology Service Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Most Technology Service Co., Ltd. is reported:

| Test                  | Range      | Measurement Uncertainty | Notes |
|-----------------------|------------|-------------------------|-------|
| Radiated Emission     | 30~1000MHz | 4.10 dB                 | (1)   |
| Radiated Emission     | 1~18GHz    | 4.32 dB                 | (1)   |
| Radiated Emission     | 18-40GHz   | 5.54 dB                 | (1)   |
| Conducted Disturbance | 0.15~30MHz | 3.12 dB                 | (1)   |

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

#### 4.5. Equipments Used during the Test

5.

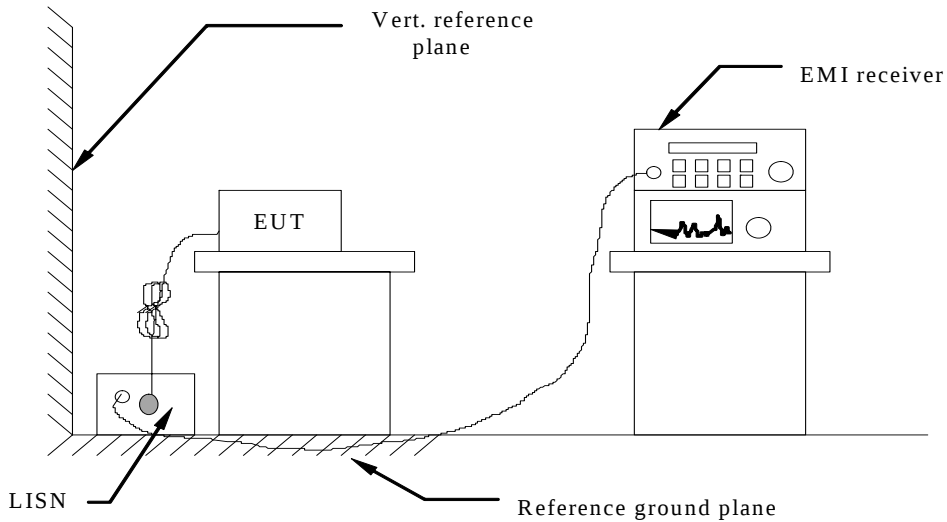
| Item | Equipment                            | Manufacturer     | Model No.       | Serial No. | Firmware versions | Last Cal.  | Cal. Interval |
|------|--------------------------------------|------------------|-----------------|------------|-------------------|------------|---------------|
| 1.   | L.I.S.N.                             | R&S              | ENV216          | 100093     | /                 | 2022/04/18 | 1 Year        |
| 2    | Three-phase artificial power network | Schwarzback Mess | NNLK8129        | 8129178    | /                 | 2022/04/18 | 1 Year        |
| 3.   | Receiver                             | R&S              | ESCI            | 100492     | V3.0-10-2         | 2022/04/06 | 1 Year        |
| 4    | Receiver                             | R&S              | ESPI            | 101202     | V3.0-10-2         | 2022/04/06 | 1 Year        |
| 5    | Spectrum analyzer                    | Agilent          | 9020A           | MT-E306    | A14.16            | 2022/04/06 | 1 Year        |
| 6    | Bilong Antenna                       | Sunol Sciences   | JB3             | A121206    | /                 | 2022/03/13 | 1 Year        |
| 7    | Horn antenna                         | HF Antenna       | HF Antenna      | MT-E158    | /                 | 2022/04/06 | 1 Year        |
| 8    | Loop antenna                         | Beijing Daze     | ZN30900B        | /          | /                 | 2022/04/15 | 1 Year        |
| 9    | Horn antenna                         | R&S              | OBH100400       | 26999002   | /                 | 2022/04/15 | 1 Year        |
| 10   | Wireless Communication Test Set      | R&S              | CMW500          | /          | CMW-BASE-3.7.21   | 2022/04/14 | 1 Year        |
| 11   | Spectrum analyzer                    | R&S              | FSP             | 100019     | V4.40 SP2         | 2022/04/14 | 1 Year        |
| 12   | High gain antenna                    | Schwarzbeck      | LB-180400KF     | MT-E389    | /                 | 2022/03/13 | 1 Year        |
| 13   | Preamplifier                         | Schwarzbeck      | BBV 9743        | MT-E390    | /                 | 2022/03/13 | 1 Year        |
| 14   | Pre-amplifier                        | EMCI             | EMC051845S<br>E | MT-E391    | /                 | 2022/03/13 | 1 Year        |
| 15   | Pre-amplifier                        | Agilent          | 83051A          | MT-E392    | /                 | 2022/03/13 | 1 Year        |
| 16   | High pass filter unit                | Tonscend         | JS0806-F        | MT-E393    | /                 | 2022/03/13 | 1 Year        |
| 17   | RF Cable(below1GHz)                  | Times            | 9kHz-1GHz       | MT-E394    | /                 | 2022/03/13 | 1 Year        |
| 18   | RF Cable(above 1GHz)                 | Times            | 1-40G           | MT-E395    | /                 | 2022/03/13 | 1 Year        |
| 19   | RF Cable (9KHz-40GHz)                | Tonscend         | 170660          | N/A        | /                 | 2022/03/13 | 1 Year        |

6. Note: The Cal.Interval was one year.

## 7. TEST CONDITIONS AND RESULTS

### 7.1. AC Power Conducted Emission

#### TEST CONFIGURATION



#### TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
- 2 Support equipment, if needed, was placed as per ANSI C63.10-2013
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
- 4 The EUT received DC5V power, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

#### AC Power Conducted Emission Limit

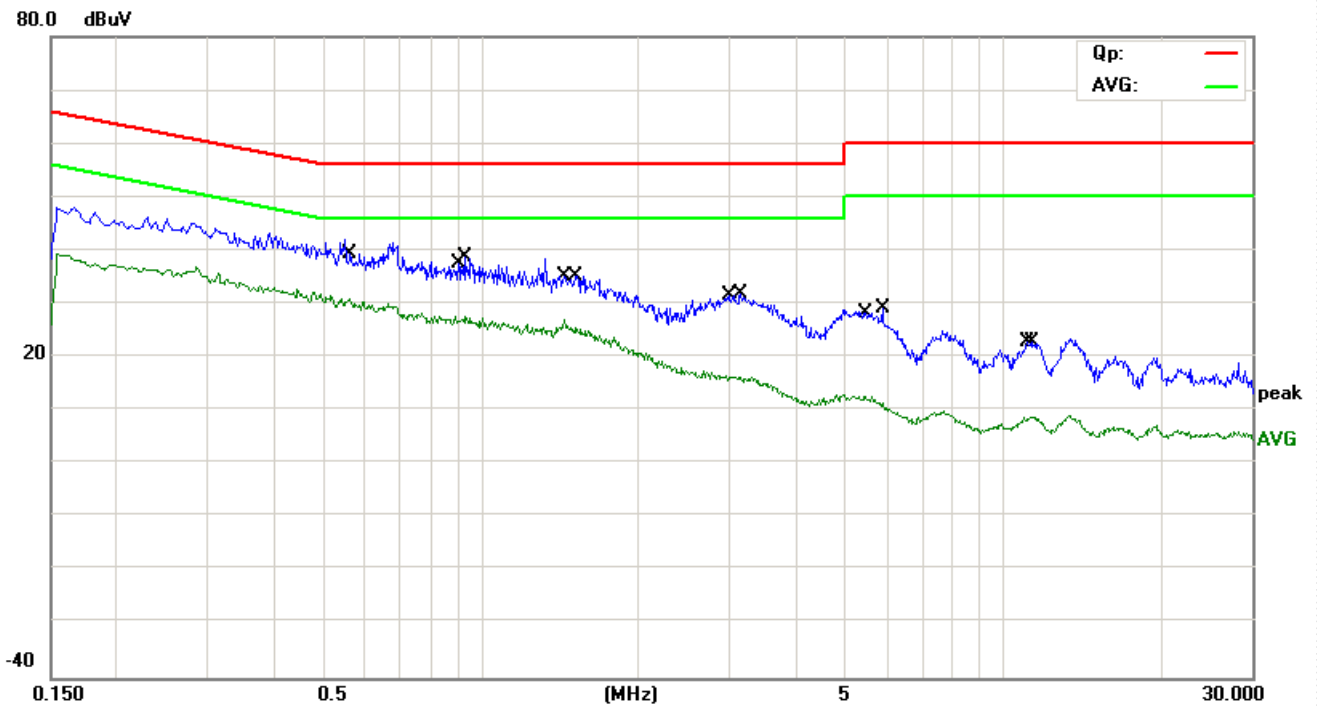
For unintentional device, according to RSS Gen 8.8 and § 15.207(a) Line Conducted Emission Limits is as following:

| Frequency<br>(MHz) | Maximum RF Line Voltage    |                         |
|--------------------|----------------------------|-------------------------|
|                    | Quasi-Peak Level<br>dB(μV) | Average Level<br>dB(μV) |
| 0.15 ~ 0.50        | 66 ~ 56*                   | 56 ~ 46*                |
| 0.50 ~ 5.00        | 56                         | 46                      |
| 5.00 ~ 30.00       | 60                         | 50                      |

#### TEST RESULTS

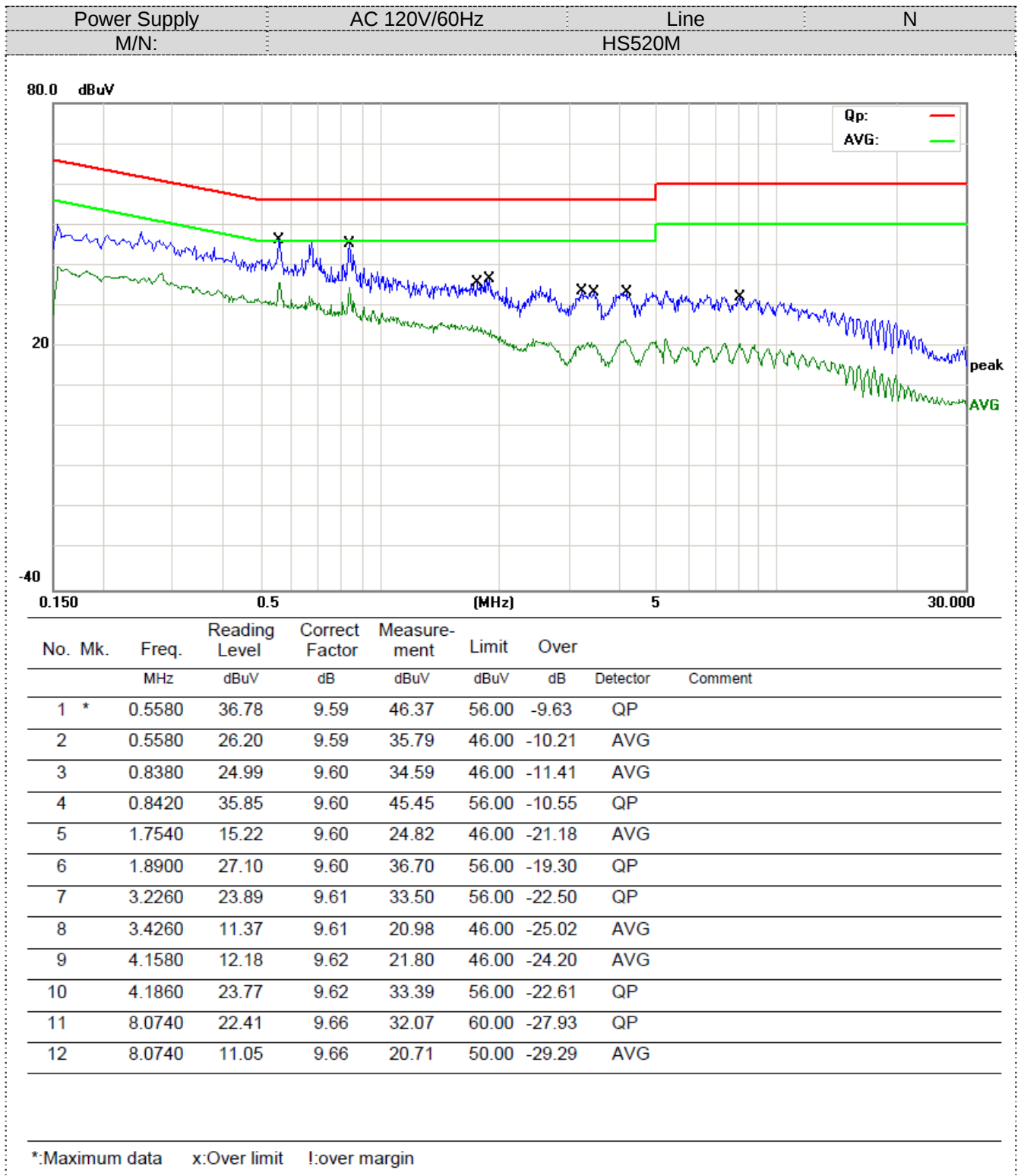
Pass

|              |              |      |   |
|--------------|--------------|------|---|
| Power Supply | AC 120V/60Hz | Line | L |
| M/N:         | HS520M       |      |   |

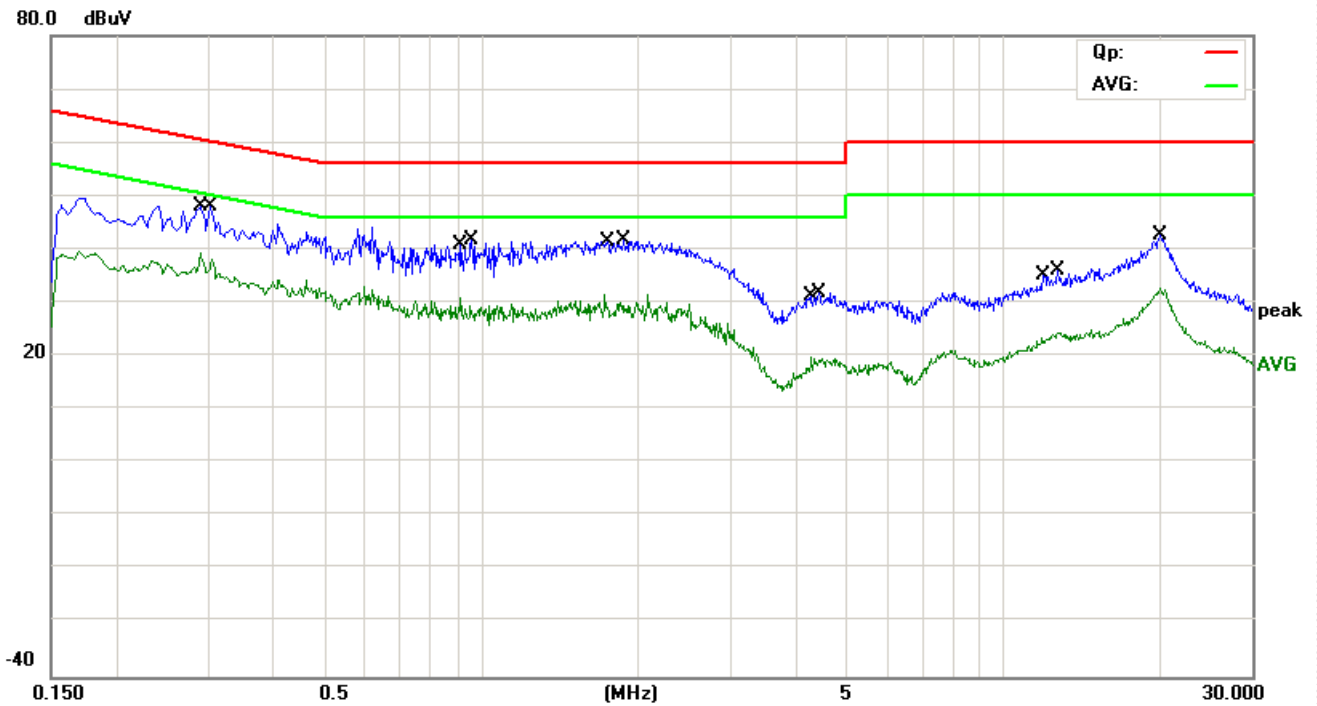


| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.5620       | 29.88                    | 9.59                    | 39.47                    | 56.00         | -16.53     | QP       |         |
| 2   | *   | 0.5620       | 21.35                    | 9.59                    | 30.94                    | 46.00         | -15.06     | AVG      |         |
| 3   |     | 0.8940       | 18.14                    | 9.60                    | 27.74                    | 46.00         | -18.26     | AVG      |         |
| 4   |     | 0.9300       | 29.04                    | 9.60                    | 38.64                    | 56.00         | -17.36     | QP       |         |
| 5   |     | 1.4420       | 17.39                    | 9.60                    | 26.99                    | 46.00         | -19.01     | AVG      |         |
| 6   |     | 1.5180       | 25.64                    | 9.60                    | 35.24                    | 56.00         | -20.76     | QP       |         |
| 7   |     | 2.9980       | 6.76                     | 9.61                    | 16.37                    | 46.00         | -29.63     | AVG      |         |
| 8   |     | 3.1540       | 22.09                    | 9.61                    | 31.70                    | 56.00         | -24.30     | QP       |         |
| 9   |     | 5.4660       | 2.90                     | 9.63                    | 12.53                    | 50.00         | -37.47     | AVG      |         |
| 10  |     | 5.8980       | 19.40                    | 9.64                    | 29.04                    | 60.00         | -30.96     | QP       |         |
| 11  |     | 11.1660      | 13.23                    | 9.69                    | 22.92                    | 60.00         | -37.08     | QP       |         |
| 12  |     | 11.3300      | -0.87                    | 9.69                    | 8.82                     | 50.00         | -41.18     | AVG      |         |

\*:Maximum data    x:Over limit    !:over margin



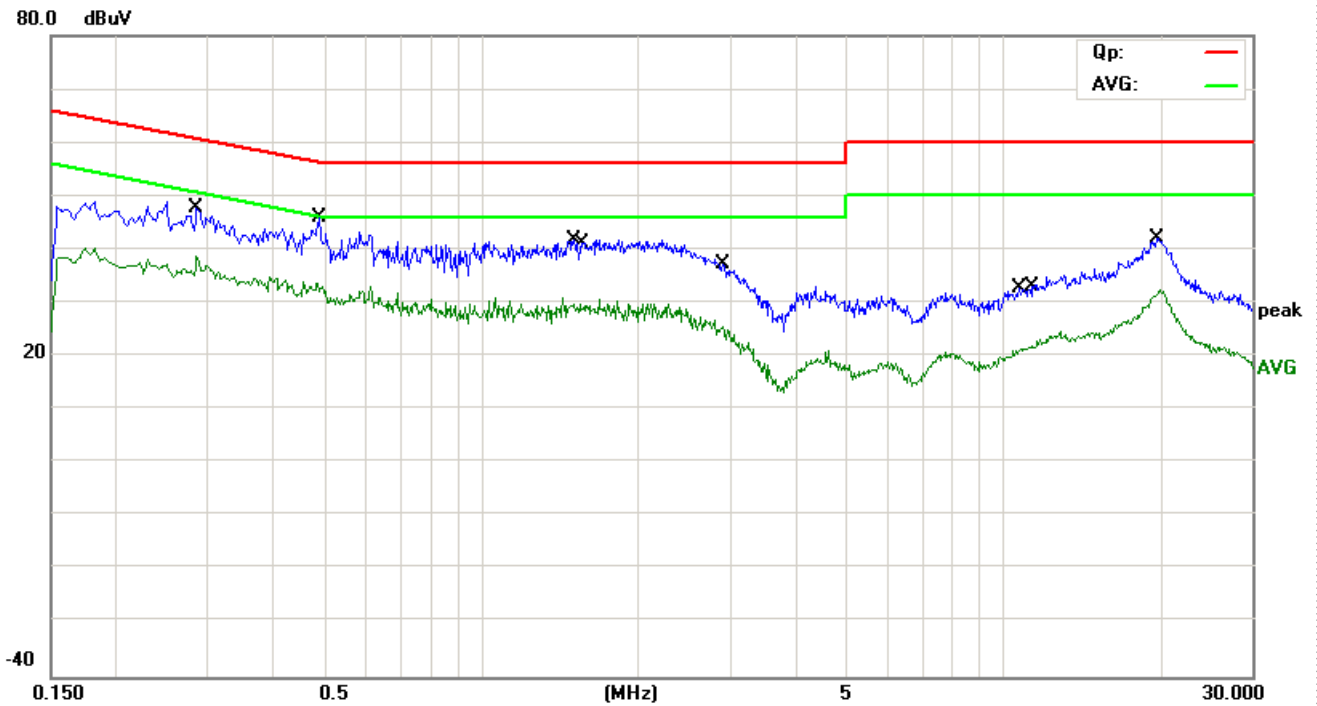
|              |                     |      |   |
|--------------|---------------------|------|---|
| Power Supply | AC 120V/60Hz        | Line | L |
| M/N:         | HS520M+Scanner Base |      |   |



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   | *   | 0.2900       | 29.70                    | 9.59                    | 39.29                    | 50.52         | -11.23     | AVG      |         |
| 2   |     | 0.3020       | 38.54                    | 9.59                    | 48.13                    | 60.19         | -12.06     | QP       |         |
| 3   |     | 0.9180       | 21.26                    | 9.60                    | 30.86                    | 46.00         | -15.14     | AVG      |         |
| 4   |     | 0.9620       | 32.11                    | 9.60                    | 41.71                    | 56.00         | -14.29     | QP       |         |
| 5   |     | 1.7340       | 21.93                    | 9.60                    | 31.53                    | 46.00         | -14.47     | AVG      |         |
| 6   |     | 1.8820       | 32.19                    | 9.60                    | 41.79                    | 56.00         | -14.21     | QP       |         |
| 7   |     | 4.3140       | 10.17                    | 9.62                    | 19.79                    | 46.00         | -26.21     | AVG      |         |
| 8   |     | 4.4540       | 22.12                    | 9.62                    | 31.74                    | 56.00         | -24.26     | QP       |         |
| 9   |     | 11.9660      | 25.32                    | 9.69                    | 35.01                    | 60.00         | -24.99     | QP       |         |
| 10  |     | 12.7220      | 14.69                    | 9.70                    | 24.39                    | 50.00         | -25.61     | AVG      |         |
| 11  |     | 19.9900      | 32.88                    | 9.73                    | 42.61                    | 60.00         | -17.39     | QP       |         |
| 12  |     | 19.9900      | 22.91                    | 9.73                    | 32.64                    | 50.00         | -17.36     | AVG      |         |

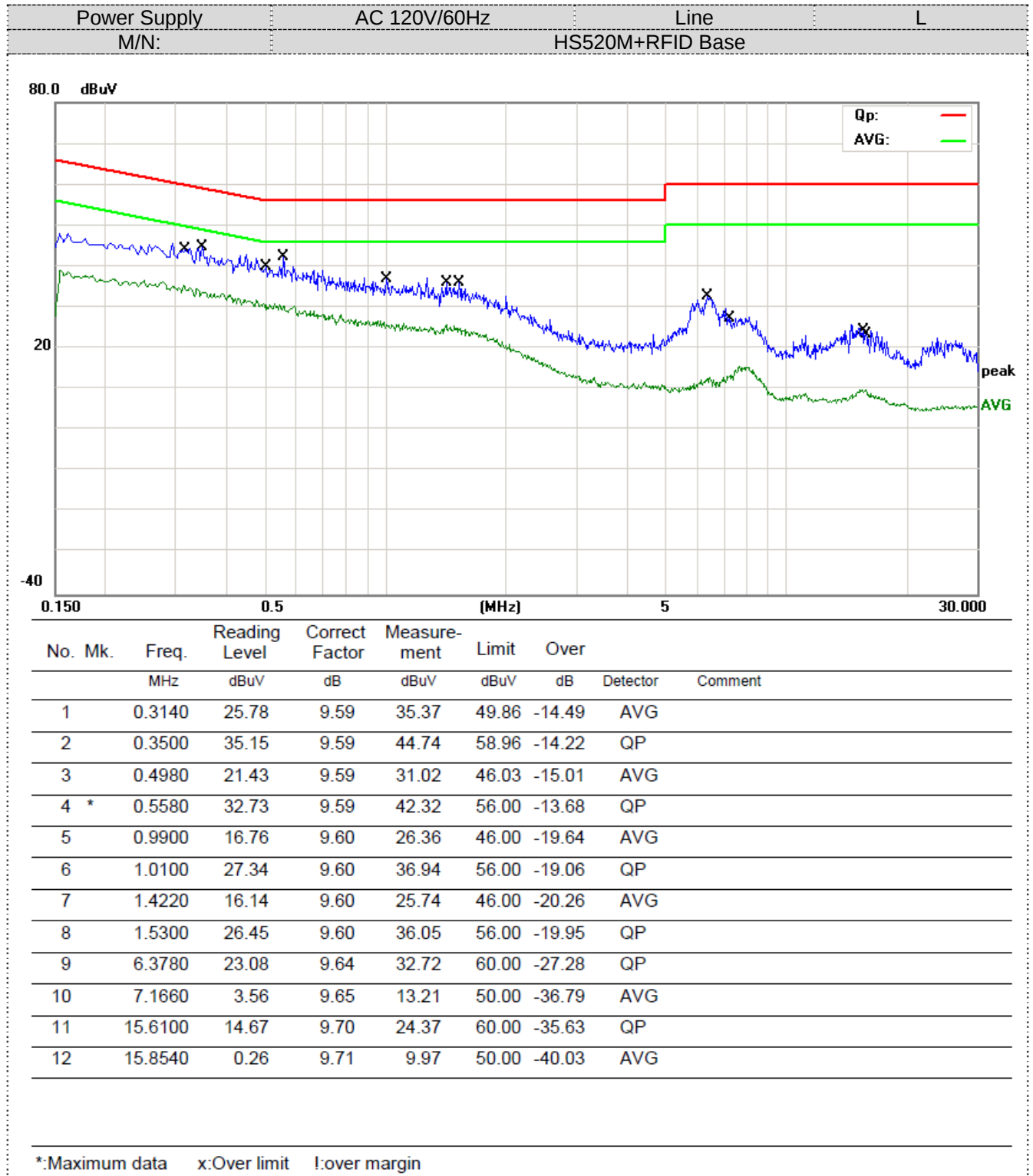
\*:Maximum data    x:Over limit    !:over margin

|              |                     |      |   |
|--------------|---------------------|------|---|
| Power Supply | AC 120V/60Hz        | Line | N |
| M/N:         | HS520M+Scanner Base |      |   |

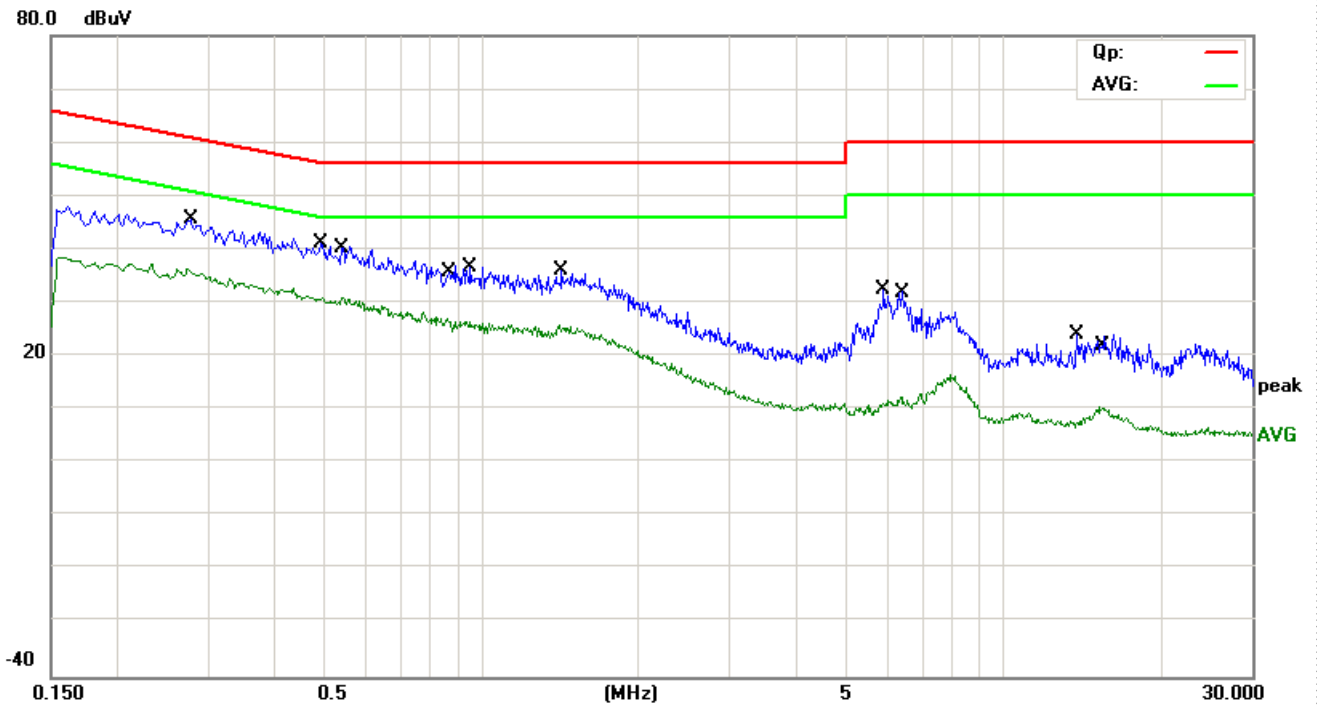


| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.2860       | 38.14                    | 9.59                    | 47.73                    | 60.64         | -12.91     | QP       |         |
| 2   |     | 0.2860       | 29.20                    | 9.59                    | 38.79                    | 50.64         | -11.85     | AVG      |         |
| 3   |     | 0.4860       | 24.06                    | 9.59                    | 33.65                    | 46.24         | -12.59     | AVG      |         |
| 4   | *   | 0.4900       | 36.26                    | 9.59                    | 45.85                    | 56.17         | -10.32     | QP       |         |
| 5   |     | 1.5100       | 32.27                    | 9.60                    | 41.87                    | 56.00         | -14.13     | QP       |         |
| 6   |     | 1.5500       | 20.23                    | 9.60                    | 29.83                    | 46.00         | -16.17     | AVG      |         |
| 7   |     | 2.9100       | 27.59                    | 9.61                    | 37.20                    | 56.00         | -18.80     | QP       |         |
| 8   |     | 2.9100       | 15.80                    | 9.61                    | 25.41                    | 46.00         | -20.59     | AVG      |         |
| 9   |     | 10.7500      | 23.18                    | 9.69                    | 32.87                    | 60.00         | -27.13     | QP       |         |
| 10  |     | 11.2500      | 12.01                    | 9.69                    | 21.70                    | 50.00         | -28.30     | AVG      |         |
| 11  |     | 19.8420      | 32.30                    | 9.73                    | 42.03                    | 60.00         | -17.97     | QP       |         |
| 12  |     | 20.0220      | 22.57                    | 9.73                    | 32.30                    | 50.00         | -17.70     | AVG      |         |

\*:Maximum data    x:Over limit    !:over margin



|              |                  |      |   |
|--------------|------------------|------|---|
| Power Supply | AC 120V/60Hz     | Line | N |
| M/N:         | HS520M+RFID Base |      |   |



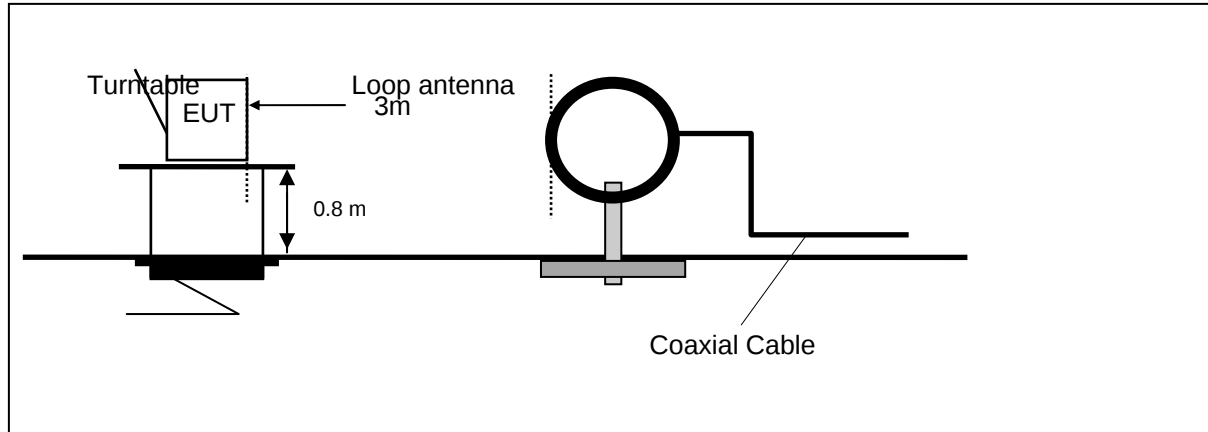
| No. | Mk. | Freq.   | Reading Level | Correct Factor | Measurement | Limit | Over   |                  |
|-----|-----|---------|---------------|----------------|-------------|-------|--------|------------------|
|     |     | MHz     | dBuV          | dB             | dBuV        | dBuV  | dB     | Detector Comment |
| 1   | *   | 0.2740  | 26.68         | 9.60           | 36.28       | 51.00 | -14.72 | AVG              |
| 2   |     | 0.2780  | 36.09         | 9.59           | 45.68       | 60.88 | -15.20 | QP               |
| 3   |     | 0.4940  | 31.43         | 9.59           | 41.02       | 56.10 | -15.08 | QP               |
| 4   |     | 0.5420  | 21.32         | 9.59           | 30.91       | 46.00 | -15.09 | AVG              |
| 5   |     | 0.8620  | 17.48         | 9.60           | 27.08       | 46.00 | -18.92 | AVG              |
| 6   |     | 0.9540  | 27.06         | 9.60           | 36.66       | 56.00 | -19.34 | QP               |
| 7   |     | 1.4180  | 16.20         | 9.60           | 25.80       | 46.00 | -20.20 | AVG              |
| 8   |     | 1.4300  | 26.59         | 9.60           | 36.19       | 56.00 | -19.81 | QP               |
| 9   |     | 5.9140  | 22.79         | 9.64           | 32.43       | 60.00 | -27.57 | QP               |
| 10  |     | 6.3020  | 2.16          | 9.64           | 11.80       | 50.00 | -38.20 | AVG              |
| 11  |     | 13.8740 | 14.35         | 9.70           | 24.05       | 60.00 | -35.95 | QP               |
| 12  |     | 15.3700 | 0.82          | 9.70           | 10.52       | 50.00 | -39.48 | AVG              |

\*:Maximum data      x:Over limit      !:over margin

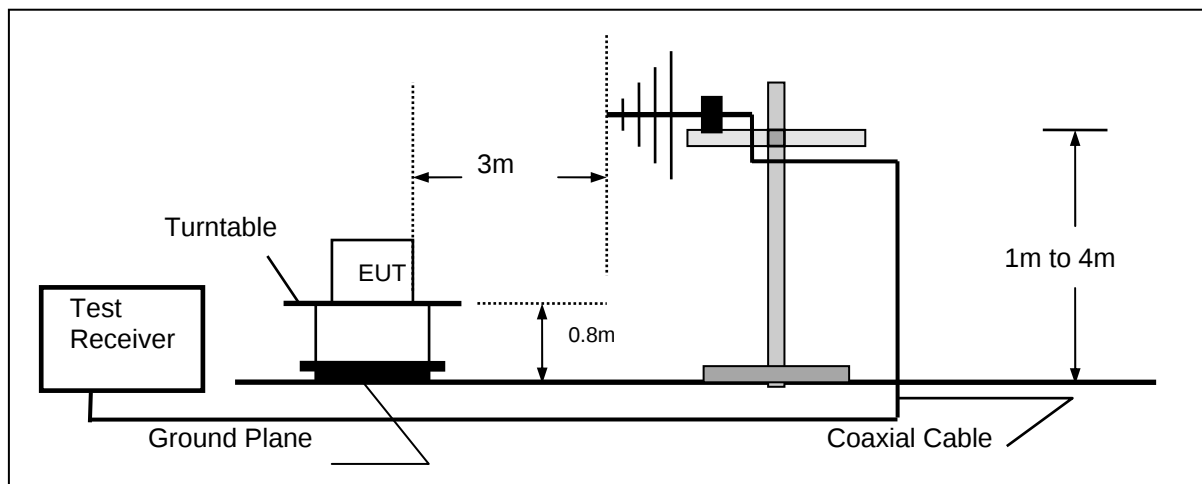
## 7.2. Radiated Emission

### TEST CONFIGURATION

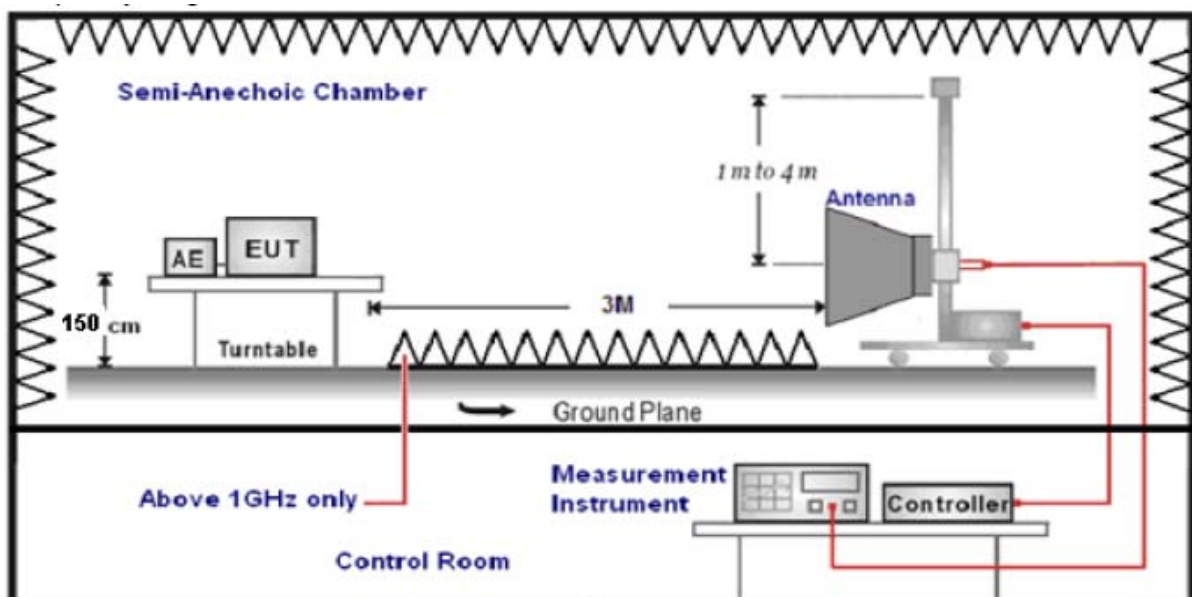
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



**TEST PROCEDURE**

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz;the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz – 25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT minimum operation frequency was 32.768KHz and maximum operation frequency was 2480MHz.so radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

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

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

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

**Field Strength Calculation**

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

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

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

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

**RADIATION LIMIT**

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in table below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission

Unwanted emissions that fall into restricted bands shall comply with the limits specified in RSS-Gen; and Unwanted emissions that do not fall within the restricted frequency bands shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

| Frequency (MHz) | Distance (Meters) | Radiated (dBμV/m)                          | Radiated (μV/m) |
|-----------------|-------------------|--------------------------------------------|-----------------|
| 0.009-0.49      | 3                 | $20\log(2400/F(\text{KHz}))+40\log(300/3)$ | 2400/F(KHz)     |
| 0.49-1.705      | 3                 | $20\log(24000/F(\text{KHz}))+40\log(30/3)$ | 24000/F(KHz)    |
| 1.705-30        | 3                 | $20\log(30)+40\log(30/3)$                  | 30              |
| 30-88           | 3                 | 49.0                                       | 100             |
| 88-216          | 3                 | 53.5                                       | 150             |
| 216-960         | 3                 | 56.0                                       | 200             |
| Above 960       | 3                 | 64.0                                       | 500             |

#### **According to FCC Part 15.205,Rastricted bands**

| MHz               | MHz                 | MHz           | GHz         |
|-------------------|---------------------|---------------|-------------|
| 0.090-0.110       | 16.42-16.423        | 399.9-410     | 4.5-5.15    |
| 10.495-0.505      | 16.69475-16.69525   | 608-614       | 5.35-5.46   |
| 2.1735-2.1905     | 16.80425-16.80475   | 960-1240      | 7.25-7.75   |
| 4.125-4.128       | 25.5-25.67          | 1300-1427     | 8.025-8.5   |
| 4.17725-4.17775   | 37.5-38.25          | 1435-1626.5   | 9.0-9.2     |
| 4.20725-4.20775   | 73-74.6             | 1645.5-1646.5 | 9.3-9.5     |
| 6.215-6.218       | 74.8-75.2           | 1660-1710     | 10.6-12.7   |
| 6.26775-6.26825   | 123-138             | 2200-2300     | 14.47-14.5  |
| 8.291-8.294       | 149.9-150.05        | 2310-2390     | 15.35-16.2  |
| 8.362-8.366       | 156.52475-156.52525 | 2483.5-2500   | 17.7-21.4   |
| 8.37625-8.38675   | 156.7-156.9         | 2690-2900     | 22.01-23.12 |
| 8.41425-8.41475   | 162.0125-167.17     | 3260-3267     | 23.6-24.0   |
| 12.29-12.293      | 167.72-173.2        | 3332-3339     | 31.2-31.8   |
| 12.51975-12.52025 | 240-285             | 3345.8-3358   | 36.43-36.5  |
| 12.57675-12.57725 | 322-335.4           | 3600-4400     | (2)         |
| 13.36-13.41       |                     |               |             |

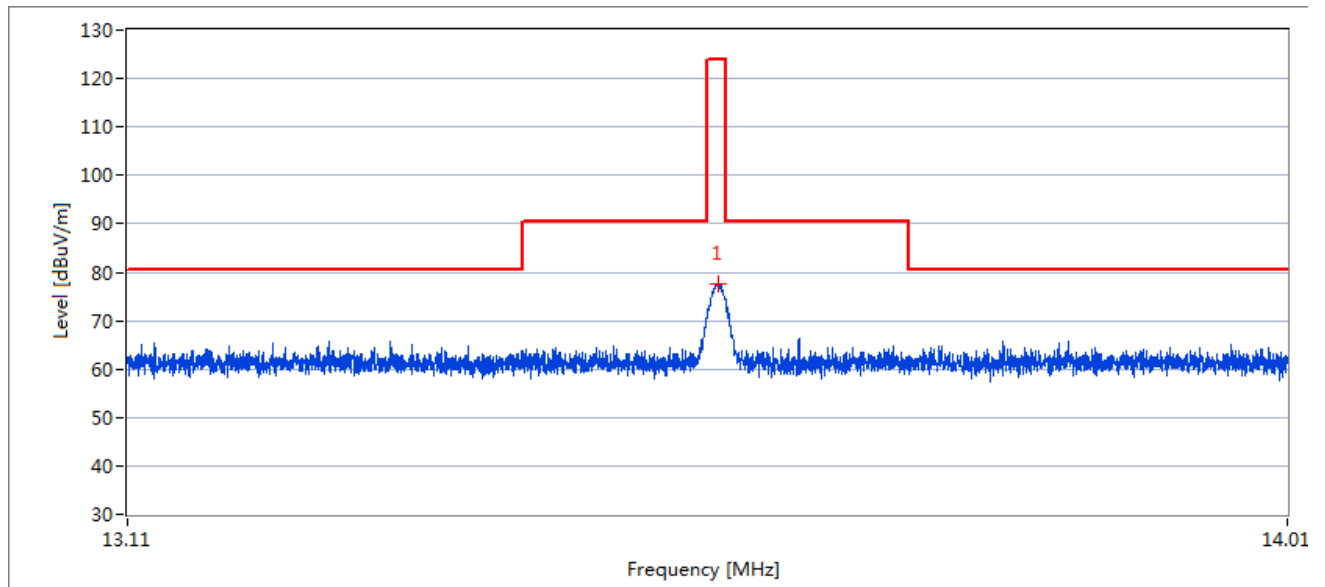
#### **LIMITS OF RADIATED EMISSION MEASUREMENT ( FCC 15.225)**

- (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, equal to 124dBuV/m at 3 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, equal to 90.5dBuV/m at 3 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, equal to 80.5dBuV/m at 3 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.

#### **TEST RESULTS (BELOW 30MHz)**

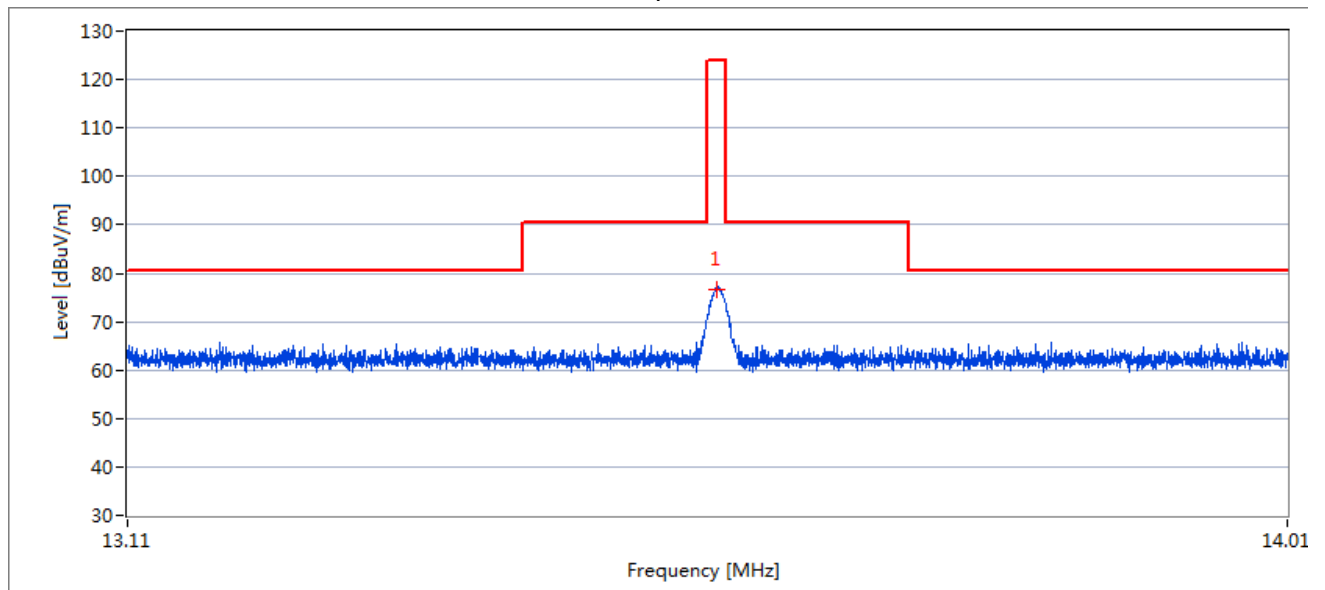
- 1: This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.
- 2: Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

**X**

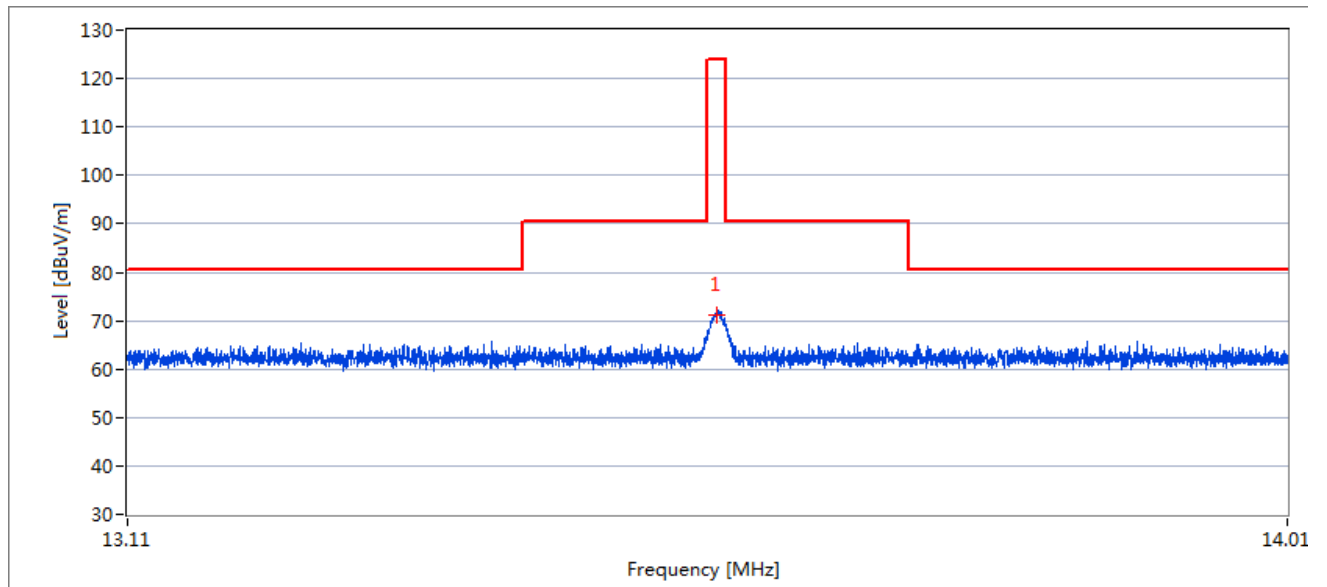


| Frequency | Pre-scan Level MaxPeak | Final Test Level MaxPeak | Limit MaxPeak | Margin |
|-----------|------------------------|--------------------------|---------------|--------|
| MHz       | dBuV/m                 | dBuV/m                   | dBuV/m        | dB     |
| 13.56     | 78.2                   | 78.2                     | 124.0         | 45.8   |

Y



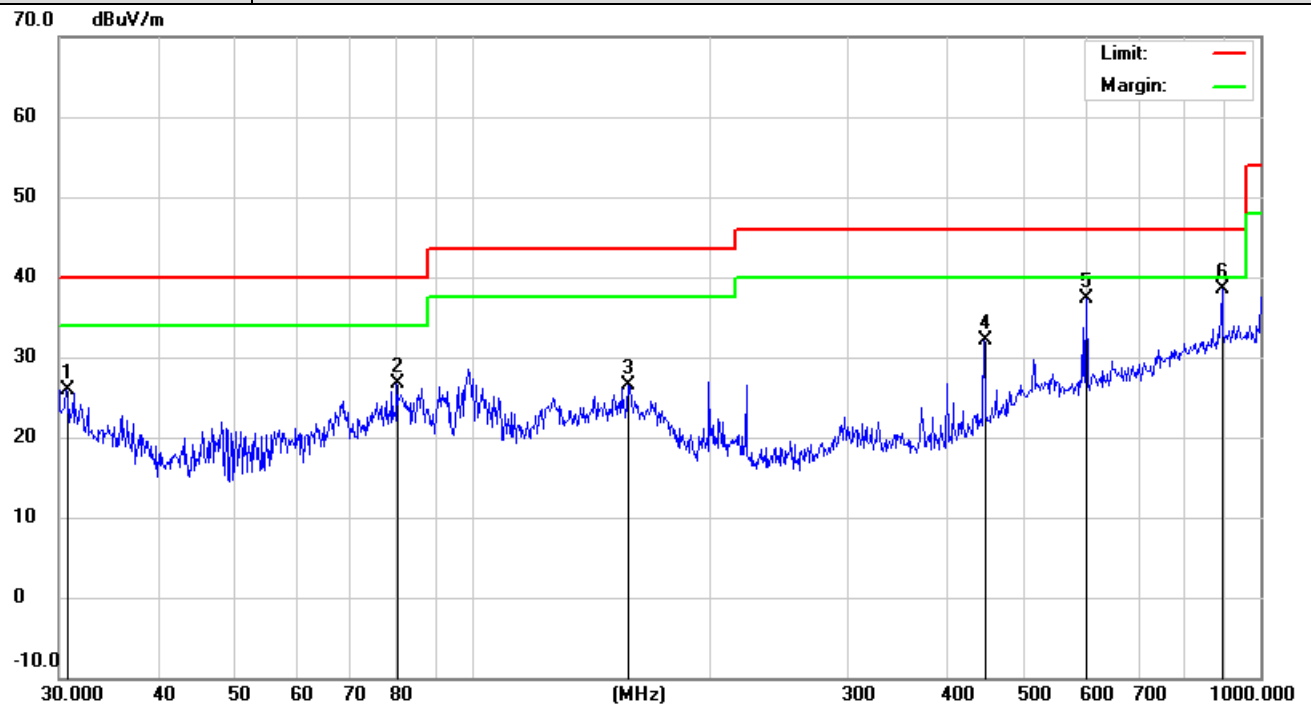
| Frequency | Pre-scan Level MaxPeak | Final Test Level MaxPeak | Limit MaxPeak | Margin |
|-----------|------------------------|--------------------------|---------------|--------|
| MHz       | dBuV/m                 | dBuV/m                   | dBuV/m        | dB     |
| 13.56     | 76.8                   | 77.5                     | 124.0         | 46.5   |



| Frequency | Pre-scan Level MaxPeak | Final Test Level MaxPeak | Limit MaxPeak | Margin |
|-----------|------------------------|--------------------------|---------------|--------|
| MHz       | dBuV/m                 | dBuV/m                   | dBuV/m        | dB     |
| 13.56     | 72.5                   | 72.5                     | 124.0         | 51.5   |

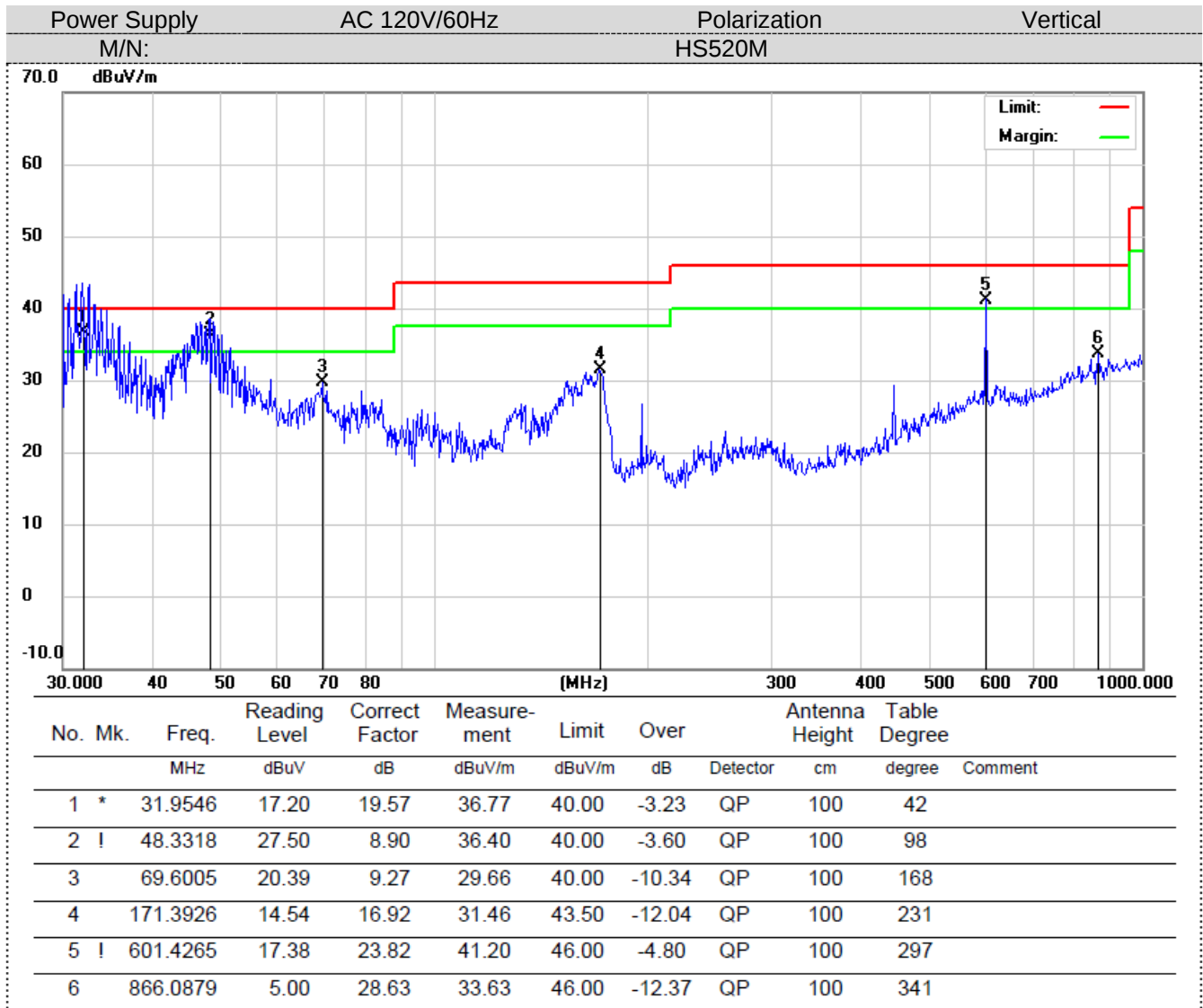
## For 30MHz-1GHz

|              |              |              |            |
|--------------|--------------|--------------|------------|
| Power Supply | AC 120V/60Hz | Polarization | Horizontal |
| M/N:         | HS520M       |              |            |



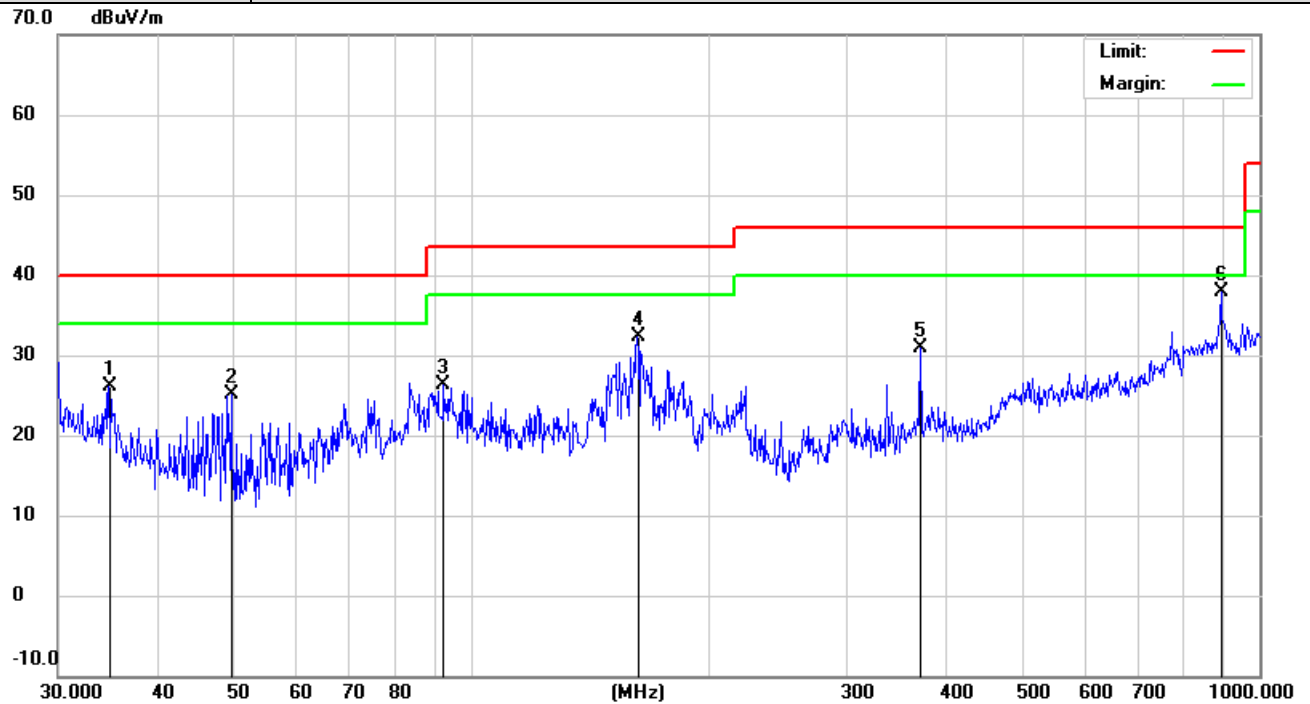
| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |        |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|--------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | Detector       | cm           | degree |
| 1   |     | 30.6379  | 5.39          | 20.47          | 25.86       | 40.00  | -14.14 | QP             | 200          | 41     |
| 2   |     | 80.3619  | 16.56         | 10.09          | 26.65       | 40.00  | -13.35 | QP             | 200          | 87     |
| 3   |     | 158.1123 | 9.18          | 17.38          | 26.56       | 43.50  | -16.94 | QP             | 200          | 142    |
| 4   |     | 446.4141 | 12.19         | 19.86          | 32.05       | 46.00  | -13.95 | QP             | 200          | 199    |
| 5   |     | 601.4265 | 13.52         | 23.82          | 37.34       | 46.00  | -8.66  | QP             | 200          | 285    |
| 6   | *   | 893.8567 | 9.53          | 28.93          | 38.46       | 46.00  | -7.54  | QP             | 200          | 316    |

\*:Maximum data    x:Over limit    !:over margin



\*:Maximum data    x:Over limit    !:over margin

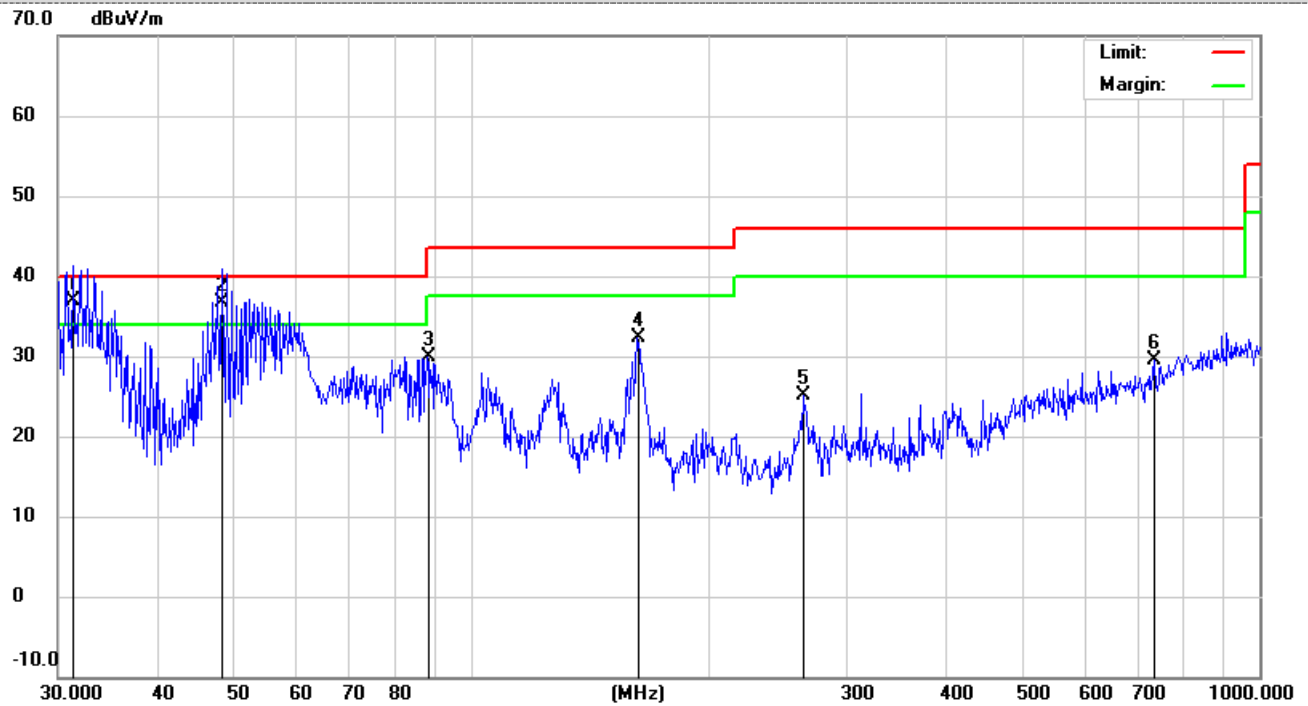
|              |                     |              |            |
|--------------|---------------------|--------------|------------|
| Power Supply | AC 120V/60Hz        | Polarization | Horizontal |
| M/N:         | HS520M+Scanner Base |              |            |



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Antenna<br>Height<br>cm | Table<br>Degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|-----------------|---------|
| 1   |     | 34.7602      | 8.46                     | 17.66                   | 26.12                      | 40.00           | -13.88     | QP                      | 200             | 24      |
| 2   |     | 49.7068      | 16.95                    | 8.24                    | 25.19                      | 40.00           | -14.81     | QP                      | 200             | 67      |
| 3   |     | 92.4624      | 15.44                    | 10.81                   | 26.25                      | 43.50           | -17.25     | QP                      | 200             | 106     |
| 4   |     | 162.6106     | 15.05                    | 17.21                   | 32.26                      | 43.50           | -11.24     | QP                      | 200             | 184     |
| 5   |     | 372.0045     | 14.05                    | 16.87                   | 30.92                      | 46.00           | -15.08     | QP                      | 200             | 237     |
| 6   | *   | 893.8567     | 8.89                     | 28.93                   | 37.82                      | 46.00           | -8.18      | QP                      | 200             | 298     |

\*:Maximum data    x:Over limit    !:over margin

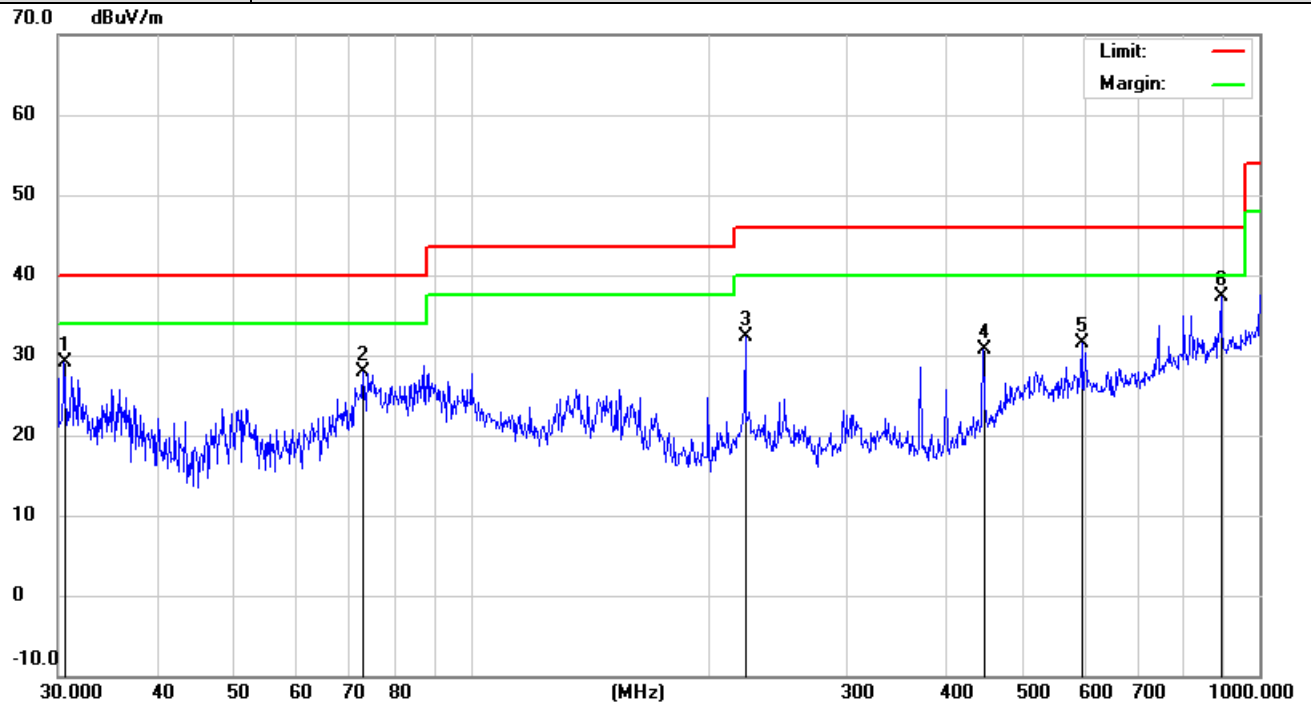
Power Supply AC 120V/60Hz Polarization Vertical  
M/N: HS520M+Scanner Base



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   | *   | 31.3992  | 17.00         | 19.95          | 36.95       | 40.00  | -3.05  | QP             | 100          | 36      |
| 2   | !   | 48.3318  | 27.90         | 8.90           | 36.80       | 40.00  | -3.20  | QP             | 100          | 87      |
| 3   |     | 88.0329  | 20.00         | 9.94           | 29.94       | 43.50  | -13.56 | QP             | 100          | 147     |
| 4   |     | 162.6106 | 15.13         | 17.21          | 32.34       | 43.50  | -11.16 | QP             | 100          | 197     |
| 5   |     | 263.8190 | 10.81         | 14.27          | 25.08       | 46.00  | -20.92 | QP             | 100          | 254     |
| 6   |     | 734.4913 | 3.44          | 26.07          | 29.51       | 46.00  | -16.49 | QP             | 100          | 301     |

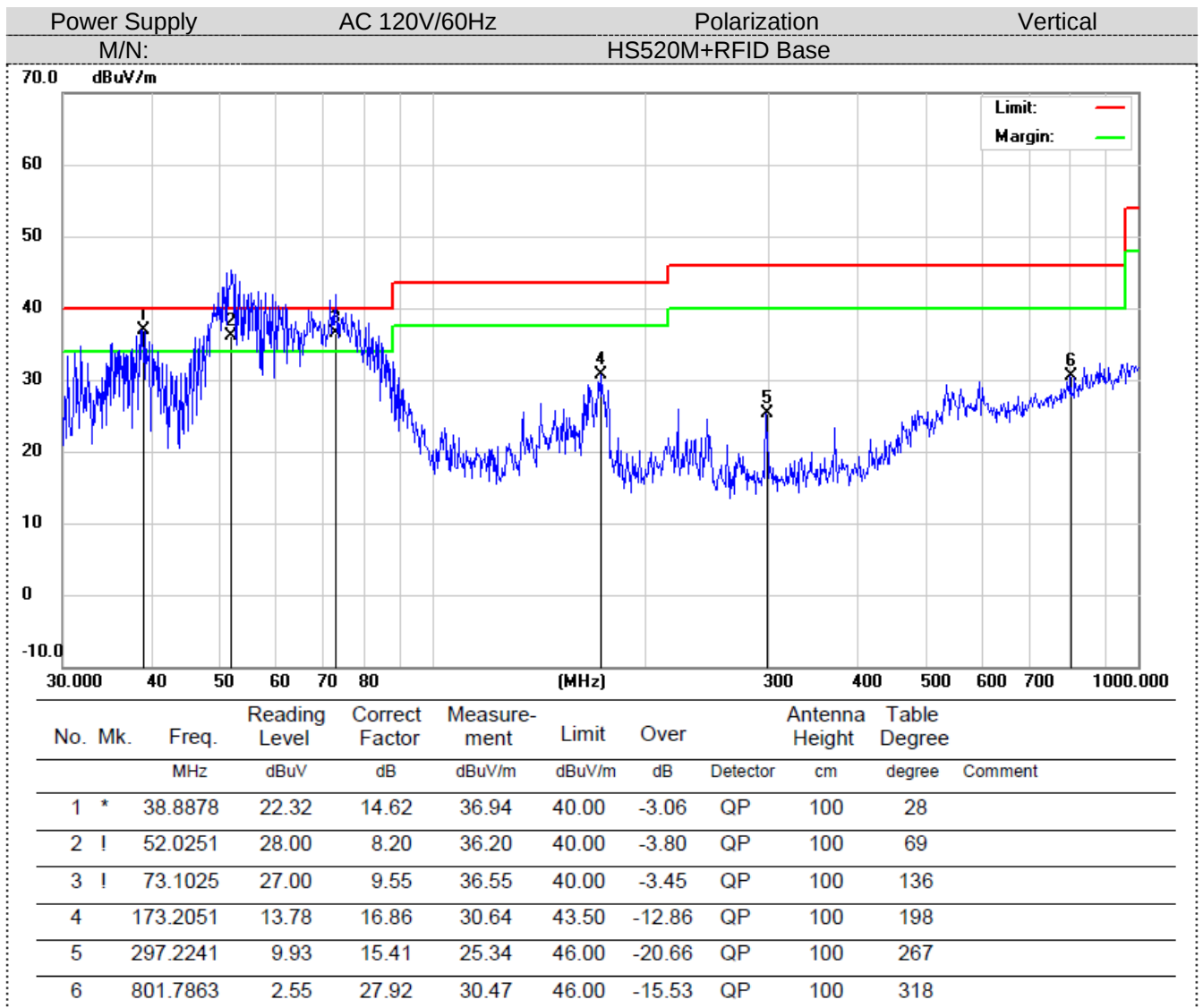
\*:Maximum data    x:Over limit    !:over margin

|              |                  |              |            |
|--------------|------------------|--------------|------------|
| Power Supply | AC 120V/60Hz     | Polarization | Horizontal |
| M/N:         | HS520M+RFID Base |              |            |



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Antenna<br>Height<br>cm | Table<br>Degree<br>degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|---------------------------|---------|
| 1   |     | 30.5306      | 8.56                     | 20.54                   | 29.10                      | 40.00           | -10.90     | QP                      | 200                       | 61      |
| 2   |     | 73.1025      | 18.27                    | 9.55                    | 27.82                      | 40.00           | -12.18     | QP                      | 200                       | 99      |
| 3   |     | 222.9502     | 17.66                    | 14.56                   | 32.22                      | 46.00           | -13.78     | QP                      | 200                       | 136     |
| 4   |     | 446.4141     | 10.91                    | 19.86                   | 30.77                      | 46.00           | -15.23     | QP                      | 200                       | 198     |
| 5   |     | 595.1329     | 7.70                     | 23.75                   | 31.45                      | 46.00           | -14.55     | QP                      | 200                       | 264     |
| 6   | *   | 893.8567     | 8.32                     | 28.93                   | 37.25                      | 46.00           | -8.75      | QP                      | 200                       | 312     |

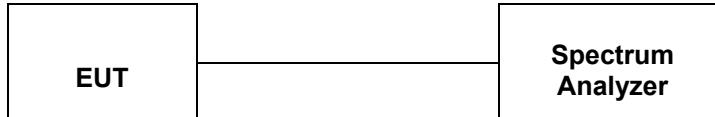
\*:Maximum data    x:Over limit    !:over margin



\*:Maximum data    x:Over limit    !:over margin

### 7.3. 20dB Bandwidth

#### TEST CONFIGURATION



#### TEST PROCEDURE

The 20dB bandwidth and 99% bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

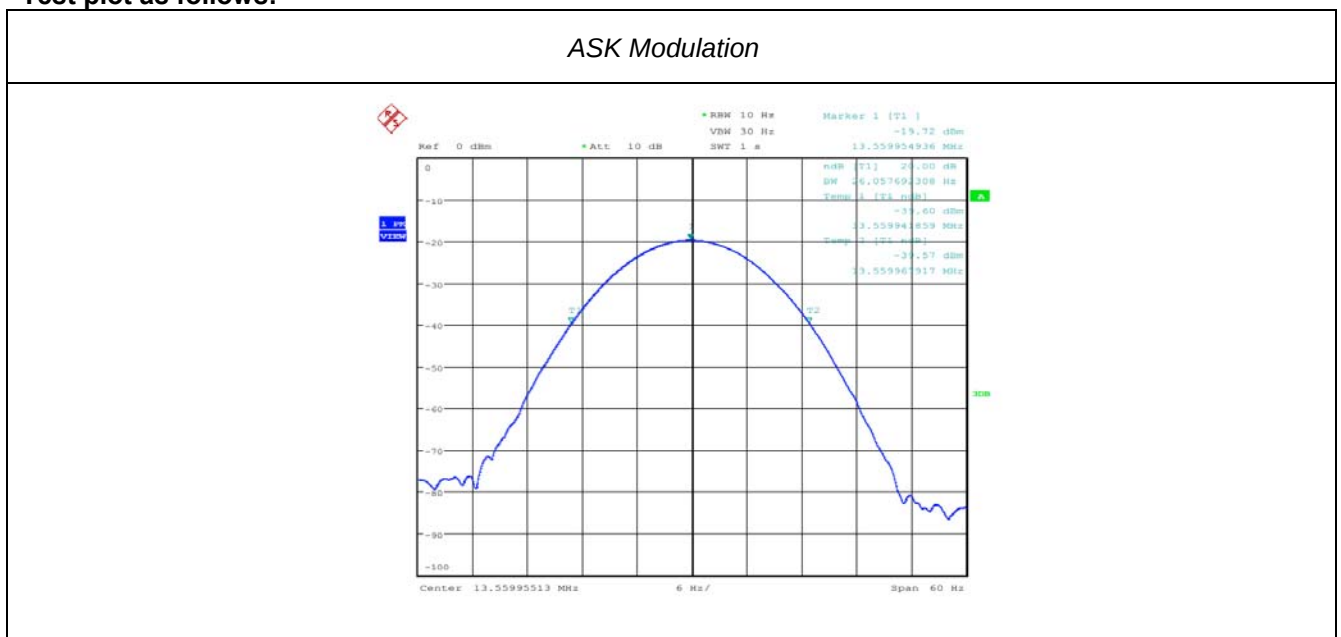
The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

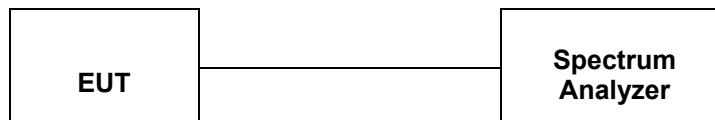
The occupied bandwidth (OBW), that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission

#### TEST RESULTS

| Modulation | Channel Frequency (MHz) | 20dB bandwidth (KHz) | Result |
|------------|-------------------------|----------------------|--------|
| ASK        | 13.56                   | 0.026                | Pass   |

Test plot as follows:



**7.4. FREQUENCY TOLERANCE****TEST CONFIGURATION****TEST PROCEDURE**

The EUT was placed on a turn table which is 0.8m above ground plane.

Set EUT as normal operation

Set SPA Center Frequency = fundamental frequency, RBW, VBW= 10kHz, Span=100K

Set SPA Max hold. Mark peak.

**TEST RESULTS**

| Power Supply | Temperature(°C) | Measured Frequency (MHz) | Frequency Error (MHz) | Result(ppm) | Part 15.225 Limit |
|--------------|-----------------|--------------------------|-----------------------|-------------|-------------------|
| AC 240V      | -20             | 13.56015                 | 0.00015               | 1.14        | +/- 0.01%(100ppm) |
|              | 20              | 13.56065                 | 0.00065               | 4.76        | +/- 0.01%(100ppm) |
|              | 50              | 13.56086                 | 0.00086               | 6.31        | +/- 0.01%(100ppm) |
| AC 120V      | -20             | 13.56040                 | 0.00040               | 2.97        | +/- 0.01%(100ppm) |
|              | 20              | 13.56048                 | 0.00048               | 3.53        | +/- 0.01%(100ppm) |
|              | 50              | 13.56090                 | 0.00090               | 6.66        | +/- 0.01%(100ppm) |
| AC 100V      | -20             | 13.56078                 | 0.00078               | 5.76        | +/- 0.01%(100ppm) |
|              | 20              | 13.56055                 | 0.00055               | 4.02        | +/- 0.01%(100ppm) |
|              | 50              | 13.56087                 | 0.00087               | 6.42        | +/- 0.01%(100ppm) |

## 8. Test Setup Photos of the EUT



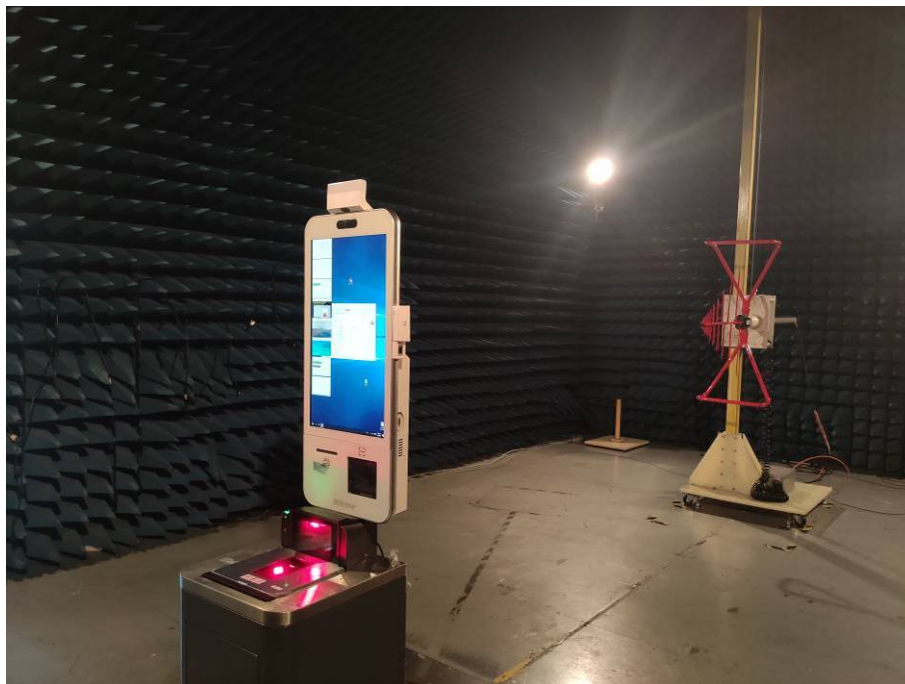
HS520M



HS520M



HS520M+Scanner Base



HS520M+Scanner Base



HS520M+RFID Base



HS520M+RFID Base



## **9. External and Internal Photos of the EUT**

See related photo report.

.....**End of Report**.....