

# TEST REPORT

**Product Name** : Metal Reader  
**Model Number** : MR1010、MR1020、MR200、MR201  
**FCC ID** : 2AJ9T-MR

**Prepared for** : ZKTECO CO., LTD.  
**Address** : No.32,Pingshan Industrial Avenue,Tangxia  
Town,Dongguan City,Guangdong Province,China 523728

**Prepared by** : EMTEK (SHENZHEN) CO., LTD.  
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**Report Number** : ES201130152W02  
**Date(s) of Tests** : December 1, 2020 to December 8, 2020  
**Date of issue** : December 9, 2020

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## TEST RESULT CERTIFICATION

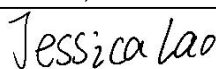


Applicant : ZKTECO CO., LTD.  
Address : No.32,Pingshan Industrial Avenue,Tangxia Town,  
Dongguan City,Guangdong Province,China 523728  
Manufacturer : ZKTECO CO., LTD.  
Address : No.32,Pingshan Industrial Avenue,Tangxia Town,  
Dongguan City,Guangdong Province,China 523728  
EUT : Metal Reader  
Model Name : MR1010、MR1020、MR200、MR201  
Trademark : N/A

Measurement Procedure Used:

| APPLICABLE STANDARDS  |             |
|---|-------------|
| STANDARD  | TEST RESULT |
| FCC 47 CFR Part 2, Subpart J<br>FCC 47 CFR Part 15, Subpart C | PASS        |

The above equipment was tested by EMTEK(SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207&15.209.

The test results of this report relate only to the tested sample identified in this report.

Date of Test : December 1, 2020 to December 8, 2020  
Prepared by :   
Jessica Lao /Editor  
Reviewer :   
Sewen Guo /Supervisor  
Approve & Authorized Signer :   
Lisa Wang/Manager



## 1 EUT TECHNICAL DESCRIPTION

|                    |   |
|--------------------|---|
| Product:           | Metal Reader  |
| Model Number:      | MR1010、MR1020、MR200、MR201 (All models covered in this report are the same with each other, except for different model No.,We choose MR1010 as the final test prototype) |
| Power Supply       | DC12V from adapter  |
| Test sample        | 1#  |
| Test Voltage       | AC 120V/60Hz  |
| Adapter            | Model :ADS-45NP-12-3<br>Input:AC100-240V,50/60Hz,1.2A Max<br>Output:DC12V,3.0A  |
| Frequency Range:   | 125KHz  |
| Antenna Type:      | Induction coil antenna  |
| Antenna Gain:      | 0.5 dBi   |
| Data of Received   | December 1, 2020  |
| Temperature Range: | -20°C ~ +50°C   |

**Note:** for more details, please refer to the User's manual of the EUT.

## 2 SUMMARY OF TEST RESULT

| FCC Part Clause             | Test Parameter              | Verdict | Remark |
|-----------------------------|-----------------------------|---------|--------|
| 2.1049                      | Occupied Bandwidth          | PASS    |        |
| 15.209                      | Radiated Spurious Emissions | PASS    |        |
| 15.207                      | Conducted Emission          | PASS    |        |
| NOTE1: N/A (Not Applicable) |                             |         |        |

### RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: 2AJ9T-MR filing to comply with Section 15.225 of the FCC Part 15, Subpart C Rules.



### 3 TEST METHODOLOGY

#### 3.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 47 CFR Part 2, Subpart J

FCC 47 CFR Part 15, Subpart C

#### 3.2 MEASUREMENT EQUIPMENT USED

##### 3.2.1 Conducted Emission Test Equipment

| Equ.No. | Equipment         | Manufacturer    | Model No. | Serial No. | Last Cal.    | Cal. Interval |
|---------|-------------------|-----------------|-----------|------------|--------------|---------------|
| EE-229  | EMI Test Receiver | Rohde & Schwarz | ESCI      | 101384     | May 17, 2020 | 1Year         |
| EE-145  | AMN               | Rohde & Schwarz | ENV216    | 101161     | May 16, 2020 | 1Year         |
| EE-022  | AMN               | Kyoritsu        | KNW-407   | 8-1492-9   | May 16, 2020 | 1Year         |

##### 3.2.2 Radiated Emission Test Equipment

| Equ.No. | Equipment         | Manufacturer    | Model No.  | Serial No.     | Last Cal. | Cal. Interval |
|---------|-------------------|-----------------|------------|----------------|-----------|---------------|
| EE-040  | Pre-Amplifier     | HP              | 8447F      | 2944A07999     | 2020/5/16 | 1Year         |
| EE-343  | EMI Test Receiver | Rohde & Schwarz | ESCI       | 101414         | 2020/5/16 | 1Year         |
| EE-371  | Bilog Antenna     | Schwarzbeck     | VULB9163   | 712            | 2019/9/22 | 2 Year        |
| EE-247  | Horn antenna      | Schwarzbeck     | BBHA9120D  | 9120D-1178     | 2020/7/4  | 2 Year        |
| EE-237  | Pre-Amplifier     | Lunar EM        | LNA1G18-48 | J1011131010001 | 2020/5/16 | 1Year         |
| EE-230  | Spectrum Analyzer | Rohde & Schwarz | FSV40      | 100967         | 2020/5/16 | 1Year         |
| EE-095  | Horn antenna      | Schwarzbeck     | BBHA9170   | 9170-399       | 2019/6/16 | 2 Year        |
| EE-157  | Loop Antenna      | Schwarzbeck     | FMZB1519   | 1519-012       | 2019/7/14 | 2 Year        |

##### 3.2.3 Radio Frequency Test Equipment

| Equ.No.  | Equipment       | Manufacturer  | Model No.     | Serial No. | Last Cal. | Cal. Interval |
|----------|-----------------|---------------|---------------|------------|-----------|---------------|
| EE-378   | Signal Analyzer | Agilent       | N9010A        | MY53470879 | 2020/5/16 | 1Year         |
| EE-472-2 | Power Splitter  | Mini-Circuits | ZX10-2-183-S+ | \          | 2020/5/16 | 1Year         |
| EE-548   | DC Power        | Manson        | HCS-3202      | G431609656 | 2020/8/29 | 1Year         |
| EE-379   | Power Meter     | \             | PS-X10-100    | \          | 2020/5/16 | 1Year         |

**Remark:** Each piece of equipment is scheduled for calibration once a year.

### 3.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting mode is programmed.

### 3.4 TEST SOFTWARE

| Item              | Software  |
|-------------------|---|
| RF conducted:     | : ETSI Certification of Regulations Test Solution(V1.04.01) |
|                   |   |
| Radiated Emission | : EMTEK(Ver.RA-03A1)-Shenzhen                               |

## 4 FACILITIES AND ACCREDITATIONS

### 4.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

Building 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

### 4.2 LABORATORY ACCREDITATIONS AND LISTINGS

#### Site Description

EMC Lab. : Accredited by CNAS, 2018.11.30  
The certificate is valid until 2022.10.28  
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2017)  
The Certificate Registration Number is L2291

Accredited by FCC  
Designation Number: CN1204  
Test Firm Registration Number: 882943  
Accredited by A2LA, August 25, 2020  
The Certificate Registration Number is 4321.01

Accredited by Industry Canada, November 09, 2018  
The Conformity Assessment Body Identifier is CN0008

Name of Firm : EMTEK(SHENZHEN) CO., LTD.  
Site Location : Building 69, Majialong Industry Zone,  
Nanshan District, Shenzhen, Guangdong, China



## 5 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Parameter                | Uncertainty             |
|--------------------------|-------------------------|
| Radio Frequency          | $\pm 1 \times 10^{-5}$  |
| Conducted Emissions Test | $\pm 2.0\text{dB}$      |
| Radiated Emission Test   | $\pm 2.0\text{dB}$      |
| Occupied Bandwidth Test  | $\pm 1.0\text{dB}$      |
| All emission, radiated   | $\pm 3\text{dB}$        |
| Temperature              | $\pm 0.5^\circ\text{C}$ |
| Humidity                 | $\pm 3\%$               |

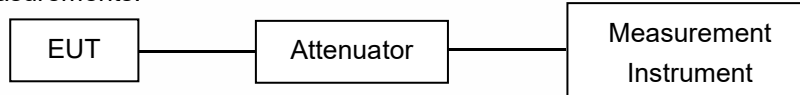
Measurement Uncertainty for a level of Confidence of 95%



## 6 SETUP OF EQUIPMENT UNDER TEST

### 6.1 RADIO FREQUENCY TEST SETUP 1

The component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



### 6.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

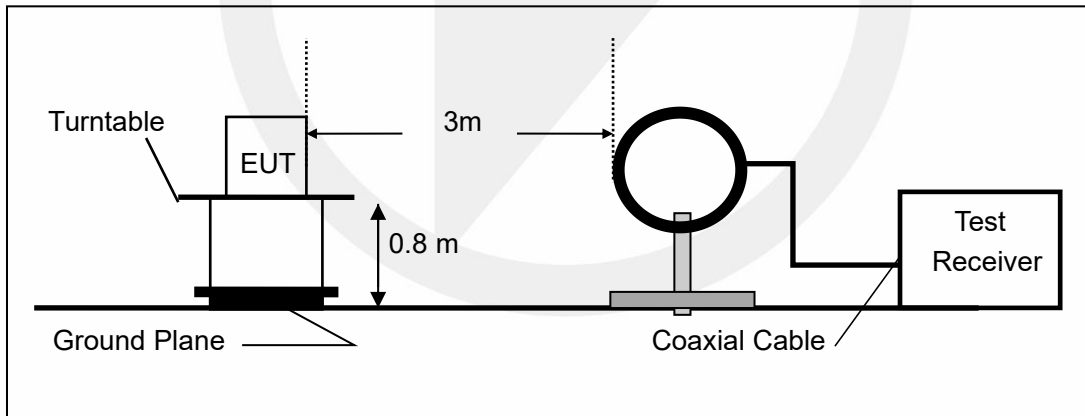
Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

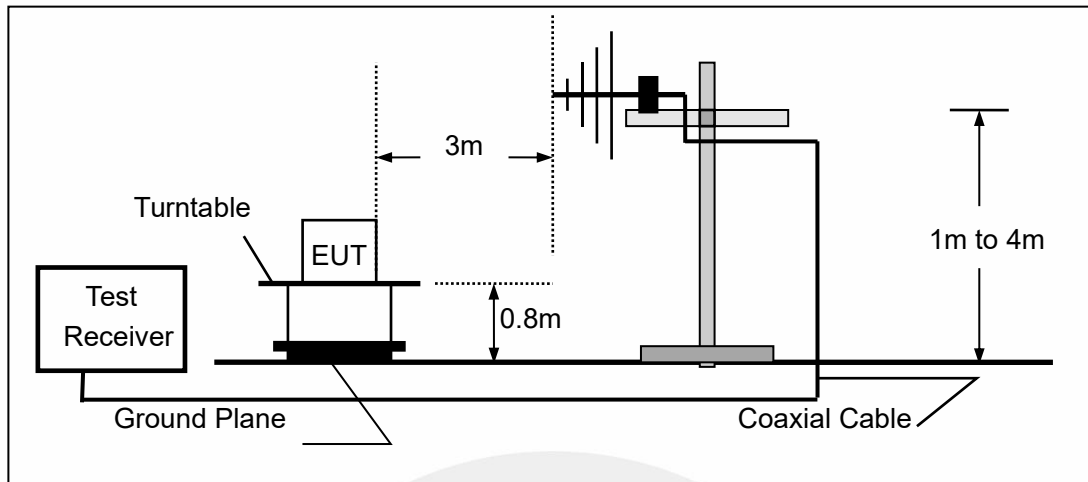
Above 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz

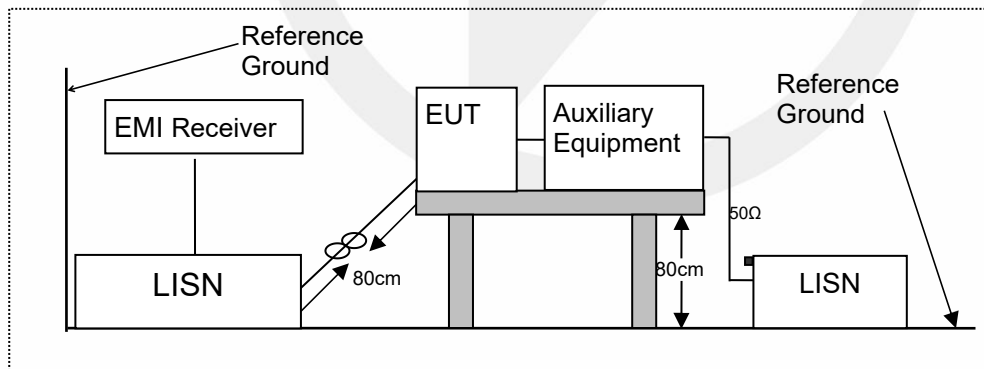


### 6.3 CONDUCTED EMISSION TEST SETUP

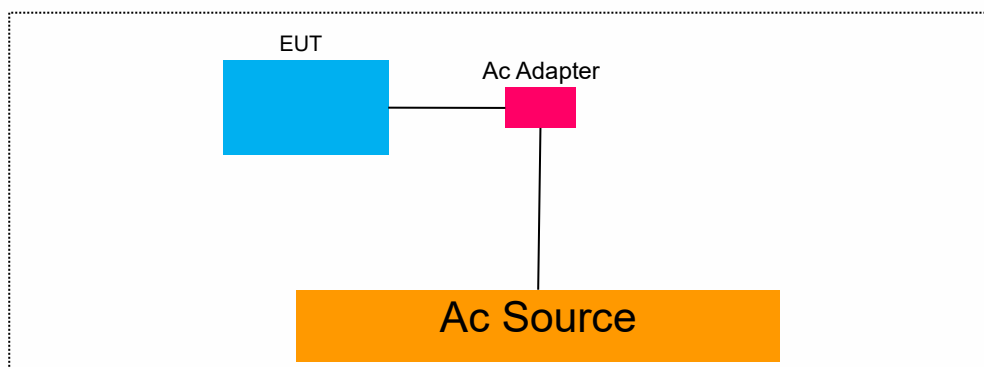
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



#### 6.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



#### 6.5 SUPPORT EQUIPMENT

| EUT Cable List and Details |            |                     |                        |
|----------------------------|------------|---------------------|------------------------|
| Cable Description          | Length (m) | Shielded/Unshielded | With / Without Ferrite |
| /                          | /          | /                   | /                      |

| Auxiliary Cable List and Details |            |                     |                        |
|----------------------------------|------------|---------------------|------------------------|
| Cable Description                | Length (m) | Shielded/Unshielded | With / Without Ferrite |
| /                                | /          | /                   | /                      |

| Auxiliary Equipment List and Details |              |       |               |
|--------------------------------------|--------------|-------|---------------|
| Description                          | Manufacturer | Model | Serial Number |
| /                                    | /            | /     | /             |

##### Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
3. Unless otherwise denoted as EUT in 『Remark』 column , device(s) used in tested system is a support equipment

## 7 TEST REQUIREMENTS

### 7.1 OCCUPIED BANDWIDTH

#### 7.1.1 Applicable Standard

According to FCC Part 2.1049

#### 7.1.2 Conformance Limit

No limit requirement.

#### 7.1.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

#### 7.1.4 Test Procedure

The EUT was operating in transmit mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 1% occupied bandwidth (10Hz).

Set the video bandwidth (VBW) = 3 times RBW .

Set Span= approximately 2 to 3 times the occupied bandwidth

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 99% down one side of the emission. Reset the markerdelta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 99% bandwidth of the emission.

If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

Measure and record the results in the test report.

#### 7.1.5 Test Results

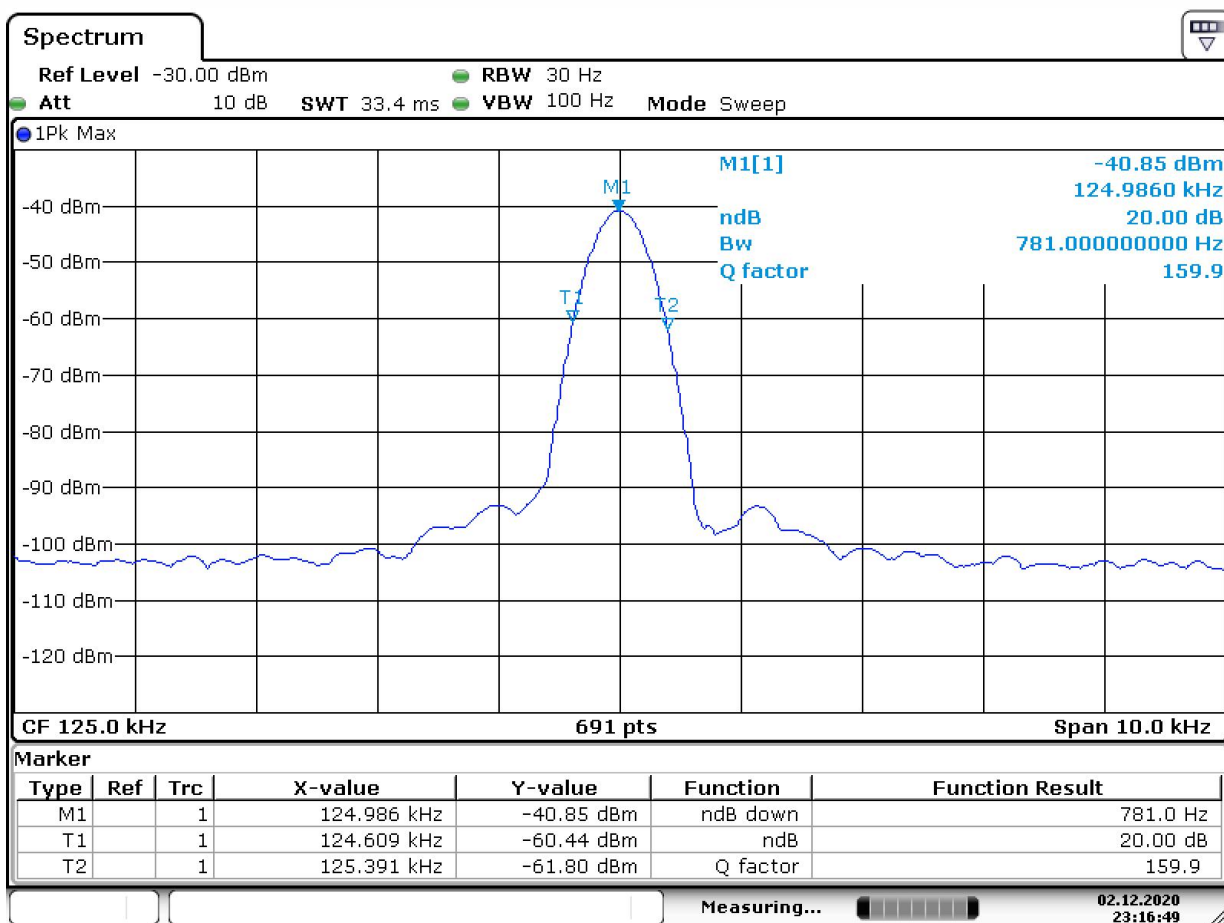
|               |      |          |    |
|---------------|------|----------|----|
| Temperature : | 25°C | Test By: | XW |
| Humidity :    | 65 % |          |    |

| Modulation Mode            | Channel Number | Channel Frequency (KHz) | -20dB Measurement Bandwidth (kHz) | Limit (kHz) | Verdict |
|----------------------------|----------------|-------------------------|-----------------------------------|-------------|---------|
| ASK                        | 1              | 125                     | 0.781                             | N/A         | PASS    |
| Note: N/A (Not Applicable) |                |                         |                                   |             |         |

Test Model

Occupied Bandwidth  
Channel 0: 125KHz

ASK Modulation



Date: 2.DEC.2020 23:16:50

## 7.2 RADIATED SPURIOUS EMISSION

### 7.2.1 Applicable Standard

According to FCC Part 15.209

### 7.2.2 Conformance Limit

| FCC Part 15.209    |                              |      |  |                         |
|--------------------|------------------------------|------|--|-------------------------|
| Frequency<br>(MHz) | Field Strength<br>Limitation |      | Field Strength Limitation Frequency tion at 3m<br>Measurement Dist |                         |
|                    | (uV/m)                       | Dist | (uV/m)   | (dBuV/m)                |
| 0.009 – 0.490      | 2400 / F(KHz)                | 300m | 10000 * 2400/F(KHz)  | 20log 2400/F(KHz) + 80  |
| 0.490 – 1.705      | 24000 / F(KHz)               | 30m  | 100 * 24000/F(KHz)   | 20log 24000/F(KHz) + 40 |
| 1.705 – 30.00      | 30                           | 30m  | 100* 30  | 20log 30 + 40           |
| 30.0 – 88.0        | 100                          | 3m   | 100  | 20log 100               |
| 88.0 – 216.0       | 150                          | 3m   | 150  | 20log 150               |
| 216.0 – 960.0      | 200                          | 3m   | 200  | 20log 200               |
| Above 960.0        | 500                          | 3m   | 500  | 20log 500               |

According to FCC Part15.205, Restricted 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       |                     |               |             |

- Remark:
1. Emission level in dBuV/m=20 log (uV/m)
  2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
  3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

### 7.2.3 Test Configuration

Test according to clause 6.2 radio frequency test setup 2

### 7.2.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

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

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 100 kHz for  $f < 1$  GHz (30MHz to 1GHz), 200Hz for  $f < 150$  KHz (9KHz to 150KHz), 9KHz for  $f < 30$  MHz (150KHz to 30KHz)

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.

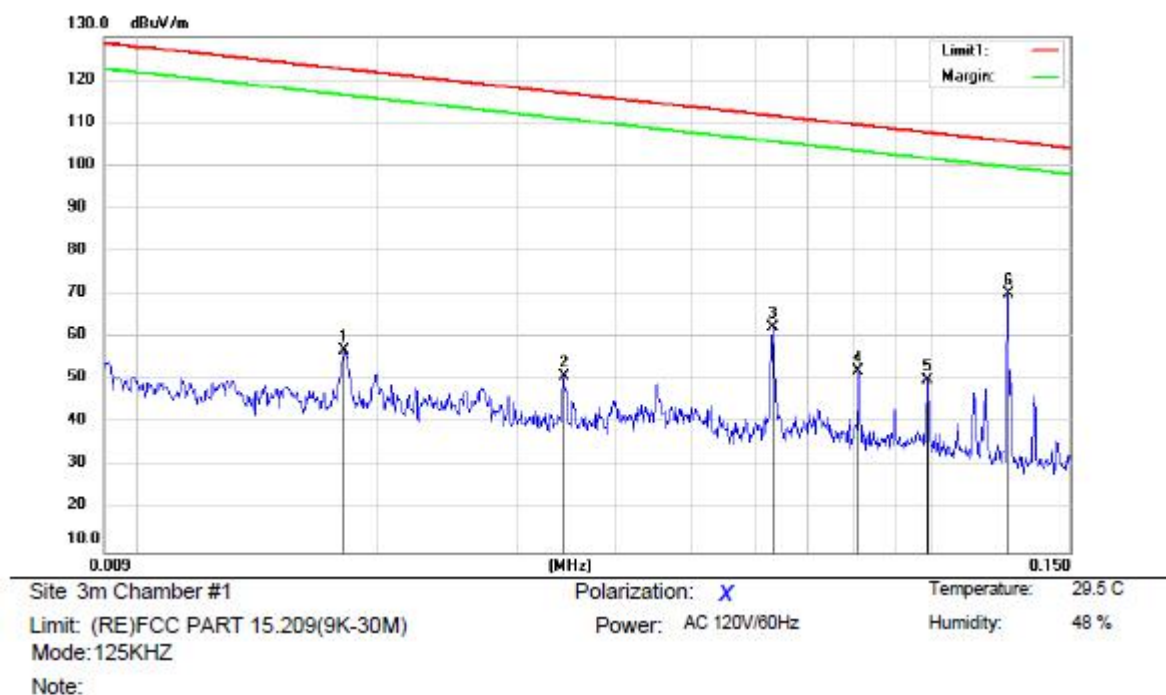
Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from  $20\log(\text{dwell time}/100 \text{ ms})$ , in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Repeat above procedures until all frequency measured was complete.

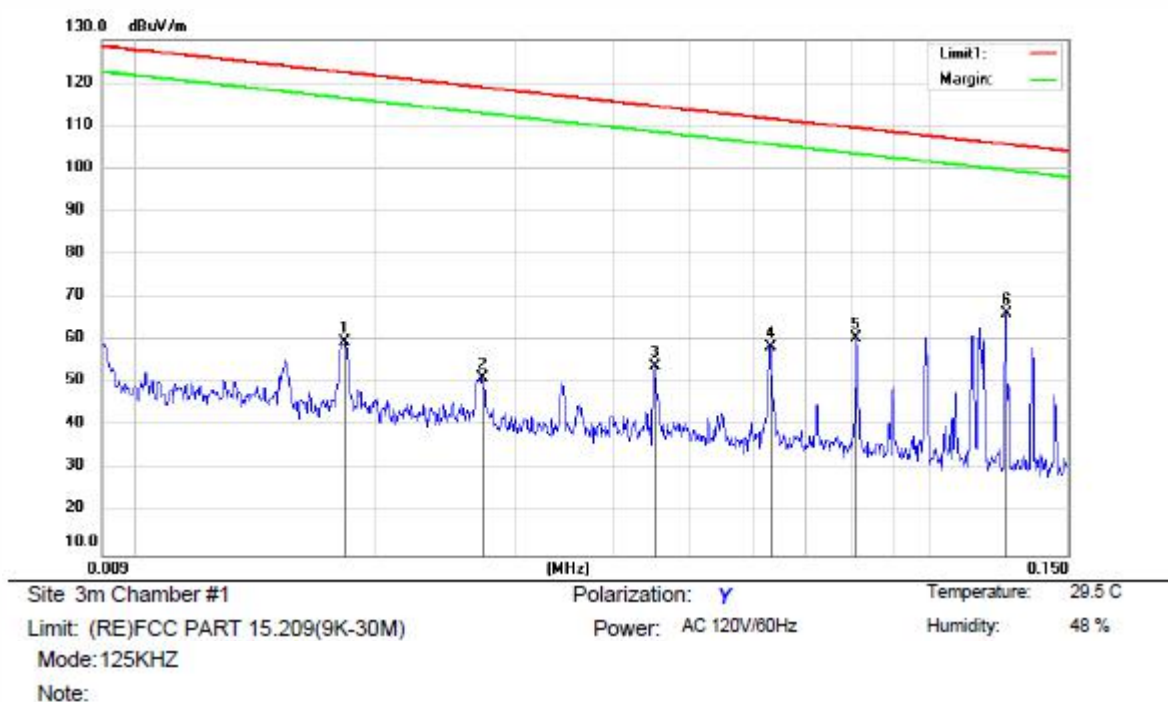
### 7.2.5 Test Results



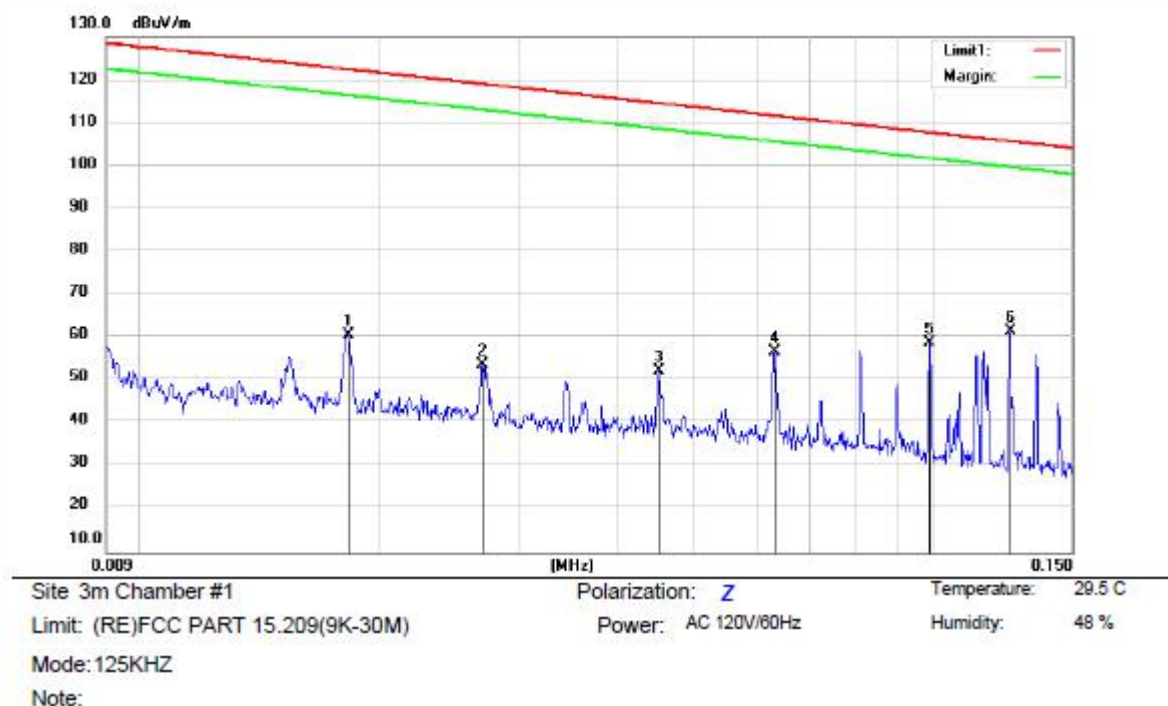
## ■ Spurious Emission below 150kHz (9KHz to 150kHz)



| 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 | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|---------------------------|----------|---------|
| 1   |     | 0.0181       | 36.22                    | 20.59                   | 56.81                      | 122.43          | -65.62     |                         |                           | peak     |         |
| 2   |     | 0.0343       | 30.27                    | 20.63                   | 50.90                      | 116.89          | -65.99     |                         |                           | peak     |         |
| 3   |     | 0.0631       | 41.55                    | 20.72                   | 62.27                      | 111.59          | -49.32     |                         |                           | peak     |         |
| 4   |     | 0.0810       | 31.57                    | 20.69                   | 52.26                      | 109.43          | -57.17     |                         |                           | peak     |         |
| 5   |     | 0.0991       | 29.35                    | 20.74                   | 50.09                      | 107.67          | -57.58     |                         |                           | peak     |         |
| 6   | *   | 0.1253       | 49.75                    | 20.41                   | 70.16                      | 105.64          | -35.48     |                         |                           | peak     |         |



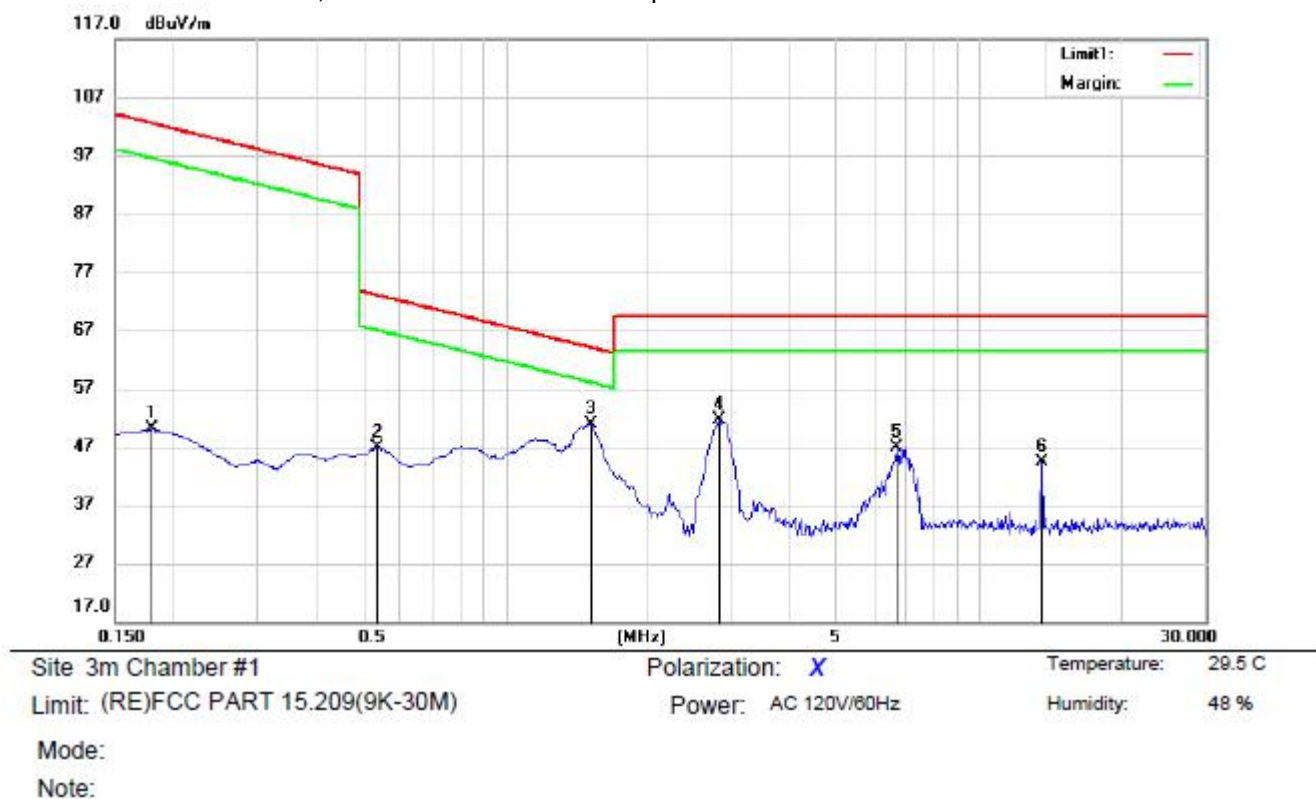
| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Antenna<br>Height<br>cm | Table<br>Degree<br>degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|---------------------------|---------|
| 1   |     | 0.0182       | 39.04                    | 20.59                   | 59.63                      | 122.39          | -62.76     | peak                    |                           |         |
| 2   |     | 0.0272       | 30.75                    | 20.59                   | 51.34                      | 118.90          | -67.56     | peak                    |                           |         |
| 3   |     | 0.0450       | 33.33                    | 20.74                   | 54.07                      | 114.53          | -60.46     | peak                    |                           |         |
| 4   |     | 0.0631       | 37.84                    | 20.72                   | 58.56                      | 111.59          | -53.03     | peak                    |                           |         |
| 5   |     | 0.0810       | 39.74                    | 20.69                   | 60.43                      | 109.43          | -49.00     | peak                    |                           |         |
| 6   | *   | 0.1253       | 45.89                    | 20.41                   | 66.30                      | 105.64          | -39.34     | peak                    |                           |         |



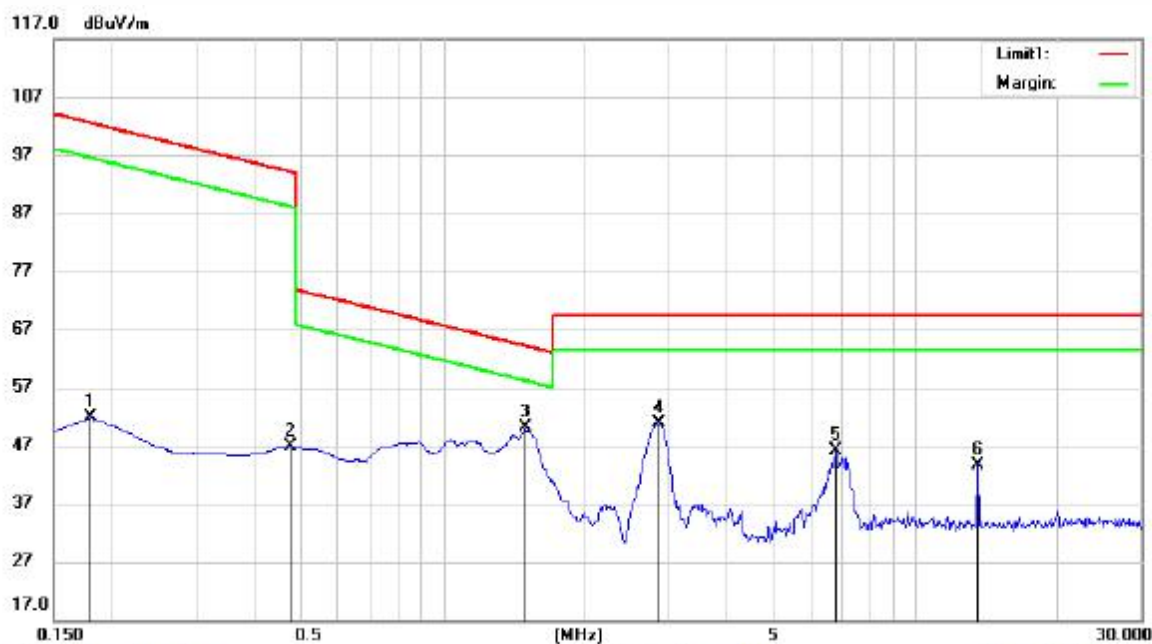
| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Antenna<br>Height<br>cm | Table<br>Degree<br>degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|---------------------------|---------|
| 1   |     | 0.0182       | 39.86                    | 20.59                   | 60.45                      | 122.39          | -61.94     | peak                    |                           |         |
| 2   |     | 0.0270       | 33.00                    | 20.59                   | 53.59                      | 118.96          | -65.37     | peak                    |                           |         |
| 3   |     | 0.0450       | 31.32                    | 20.74                   | 52.06                      | 114.53          | -62.47     | peak                    |                           |         |
| 4   |     | 0.0631       | 35.87                    | 20.72                   | 56.59                      | 111.59          | -55.00     | peak                    |                           |         |
| 5   |     | 0.0991       | 37.91                    | 20.74                   | 58.65                      | 107.67          | -49.02     | peak                    |                           |         |
| 6   | *   | 0.1253       | 40.96                    | 20.41                   | 61.37                      | 105.64          | -44.27     | peak                    |                           |         |

## Spurious Emission below 30MHz (150KHz to 30MHz)

All mode have been tested, and the worst result was report as below:



| No. | Mk. | Freq.   | Reading | Correct | Measure- | Limit  | Over   | Antenna | Table  |         |
|-----|-----|---------|---------|---------|----------|--------|--------|---------|--------|---------|
|     |     | MHz     | Level   | Factor  | ment     |        |        | Height  | Degree |         |
|     |     |         | dBuV    | dB      | dBuV/m   | dBuV/m | dB     | cm      | degree | Comment |
| 1   |     | 0.1800  | 29.69   | 20.35   | 50.04    | 102.49 | -52.45 | peak    |        |         |
| 2   |     | 0.5381  | 25.96   | 21.01   | 46.97    | 72.99  | -26.02 | peak    |        |         |
| 3   | *   | 1.5113  | 29.92   | 20.98   | 50.90    | 64.04  | -13.14 | peak    |        |         |
| 4   |     | 2.8365  | 31.03   | 20.67   | 51.70    | 69.50  | -17.80 | peak    |        |         |
| 5   |     | 6.6871  | 26.39   | 20.58   | 46.97    | 69.50  | -22.53 | peak    |        |         |
| 6   |     | 13.5526 | 24.20   | 20.21   | 44.41    | 69.50  | -25.09 | peak    |        |         |



Site 3m Chamber #1

Polarization: Y

Temperature: 29.5 C

Limit: (RE)FCC PART 15.209(9K-30M)

Power: AC 120V/60Hz

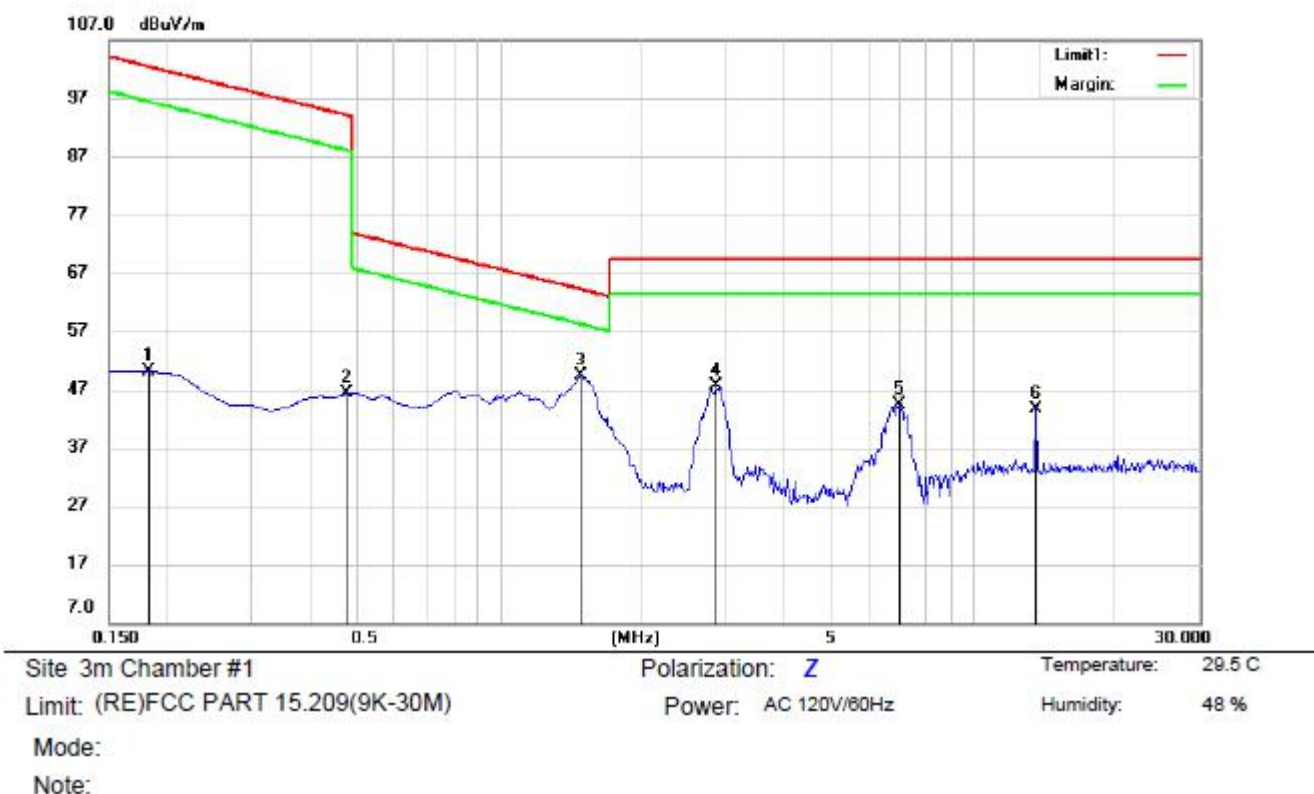
Humidity: 48 %

Mode:

Note:

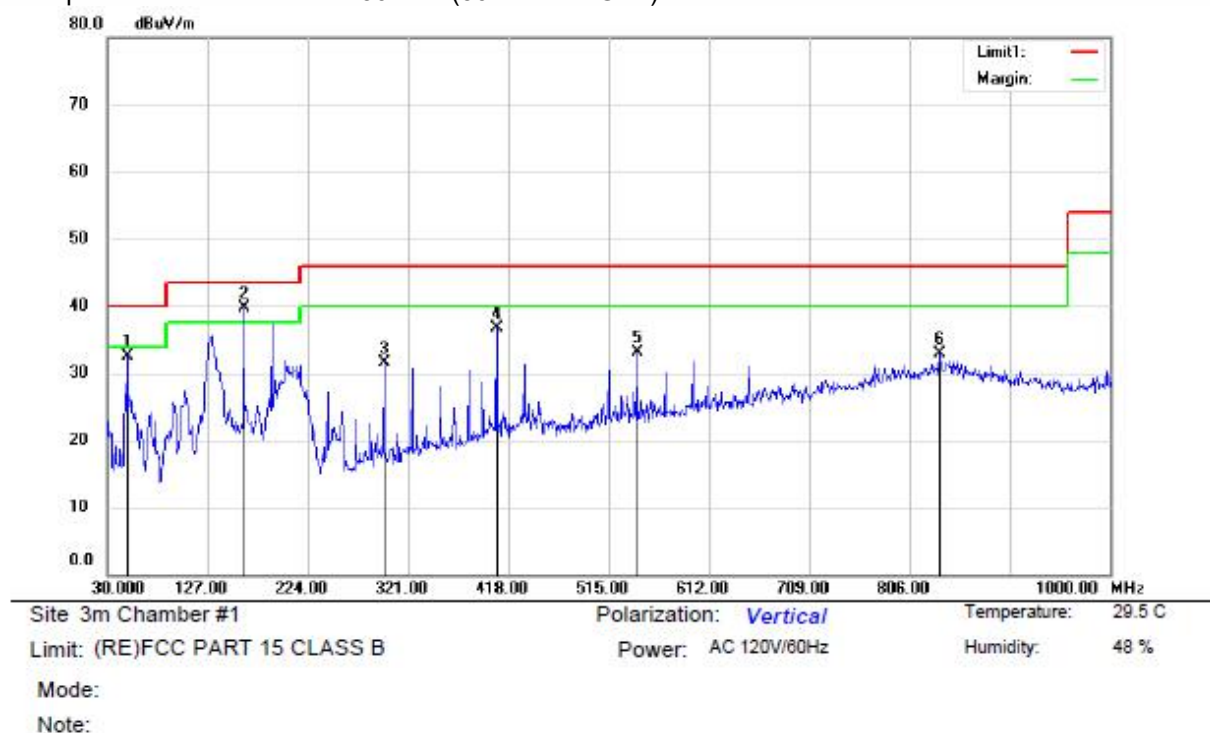
| No. | Mk. | Freq.   | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|---------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz     | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 0.1800  | 31.50         | 20.35          | 51.85       | 102.49 | -50.64 | peak           |              |         |
| 2   |     | 0.4783  | 25.87         | 20.96          | 46.83       | 94.01  | -47.18 | peak           |              |         |
| 3   | *   | 1.4953  | 29.05         | 20.99          | 50.04       | 64.14  | -14.10 | peak           |              |         |
| 4   |     | 2.8664  | 30.34         | 20.66          | 51.00       | 69.50  | -18.50 | peak           |              |         |
| 5   |     | 6.7767  | 25.64         | 20.58          | 46.22       | 69.50  | -23.28 | peak           |              |         |
| 6   |     | 13.5526 | 23.40         | 20.21          | 43.61       | 69.50  | -25.89 | peak           |              |         |



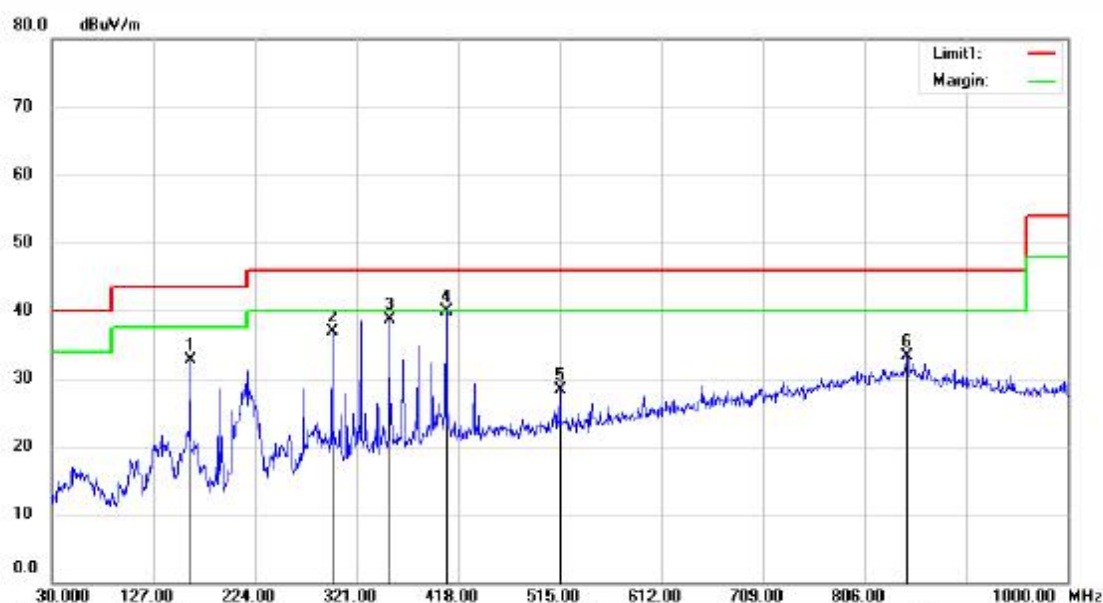


| No. | Mk. | Freq.   | Reading | Correct | Measure- | Limit  | Over   | Antenna | Table  |         |
|-----|-----|---------|---------|---------|----------|--------|--------|---------|--------|---------|
|     |     | MHz     | Level   | Factor  | ment     |        |        | Height  | Degree | Comment |
|     |     |         | dBuV    | dB      | dBuV/m   | dBuV/m | dB     | cm      | degree |         |
| 1   |     | 0.1825  | 29.81   | 20.36   | 50.17    | 102.37 | -52.20 | peak    |        |         |
| 2   |     | 0.4783  | 25.52   | 20.96   | 46.48    | 94.01  | -47.53 | peak    |        |         |
| 3   | *   | 1.4932  | 28.51   | 20.99   | 49.50    | 64.15  | -14.65 | peak    |        |         |
| 4   |     | 2.8664  | 26.97   | 20.66   | 47.63    | 69.50  | -21.87 | peak    |        |         |
| 5   |     | 7.0155  | 23.76   | 20.58   | 44.34    | 69.50  | -25.16 | peak    |        |         |
| 6   |     | 13.5526 | 23.45   | 20.21   | 43.66    | 69.50  | -25.84 | peak    |        |         |

## ■ Spurious Emission Above 30MHz (30MHz to 1GHz)



| 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 | Detector | Antenna<br>Height<br>cm | Table<br>Degree<br>degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|-------------------------|---------------------------|---------|
| 1   |     | 49.6424      | 44.68                    | -12.09                  | 32.59                      | 40.00           | -7.41      | QP       |                         |                           |         |
| 2   | *   | 162.7687     | 53.71                    | -14.08                  | 39.63                      | 43.50           | -3.87      | QP       |                         |                           |         |
| 3   |     | 298.3262     | 40.51                    | -9.08                   | 31.43                      | 46.00           | -14.57     | QP       |                         |                           |         |
| 4   |     | 406.8450     | 42.98                    | -6.26                   | 36.72                      | 46.00           | -9.28      | QP       |                         |                           |         |
| 5   |     | 542.4025     | 37.47                    | -4.35                   | 33.12                      | 46.00           | -12.88     | QP       |                         |                           |         |
| 6   |     | 835.3424     | 30.25                    | 2.66                    | 32.91                      | 46.00           | -13.09     | QP       |                         |                           |         |



Site 3m Chamber #1 Polarization: **Horizontal** Temperature: 29.5 C  
 Limit: (RE)FCC PART 15 CLASS B Power: AC 120V/60Hz Humidity: 48 %  
 Mode:  
 Note:

| 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   |     | 162.7687     | 46.80                    | -14.08                  | 32.72                      | 43.50           | -10.78     | QP                      |                           |         |
| 2   |     | 298.3262     | 45.92                    | -9.08                   | 36.84                      | 46.00           | -9.16      | QP                      |                           |         |
| 3   |     | 352.5250     | 46.40                    | -7.61                   | 38.79                      | 46.00           | -7.21      | QP                      |                           |         |
| 4   | *   | 406.8450     | 46.12                    | -6.26                   | 39.86                      | 46.00           | -6.14      | QP                      |                           |         |
| 5   |     | 515.3637     | 33.29                    | -5.00                   | 28.29                      | 46.00           | -17.71     | QP                      |                           |         |
| 6   |     | 847.5887     | 30.38                    | 2.91                    | 33.29                      | 46.00           | -12.71     | QP                      |                           |         |



## 7.3 CONDUCTED EMISSION TEST

### 7.3.1 Applicable Standard

According to FCC Part 15.207(a)

### 7.3.2 Conformance Limit

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

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

### 7.3.3 Test Configuration

Test according to clause 7.3 conducted emission test setup

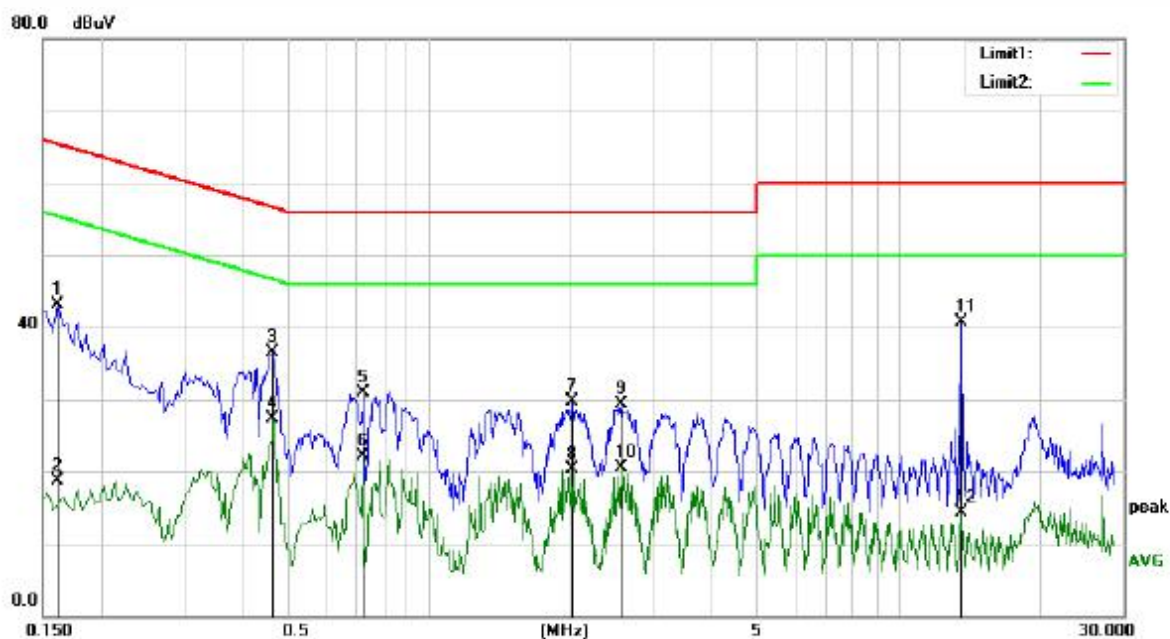
### 7.3.4 Test Procedure

The EUT was placed on a table which is 0.8m above ground plane.  
 Maximum procedure was performed on the highest emissions to ensure EUT compliance.  
 Repeat above procedures until all frequency measured were complete.

### 7.3.5 Test Results

Pass

The 120V & 240V voltage have been tested, and the worst result recorded was report as below:



Site Conduction #1

Limit: (CE)EN55032 class B\_QP

Mode: NFC Mode

Note:

Phase:

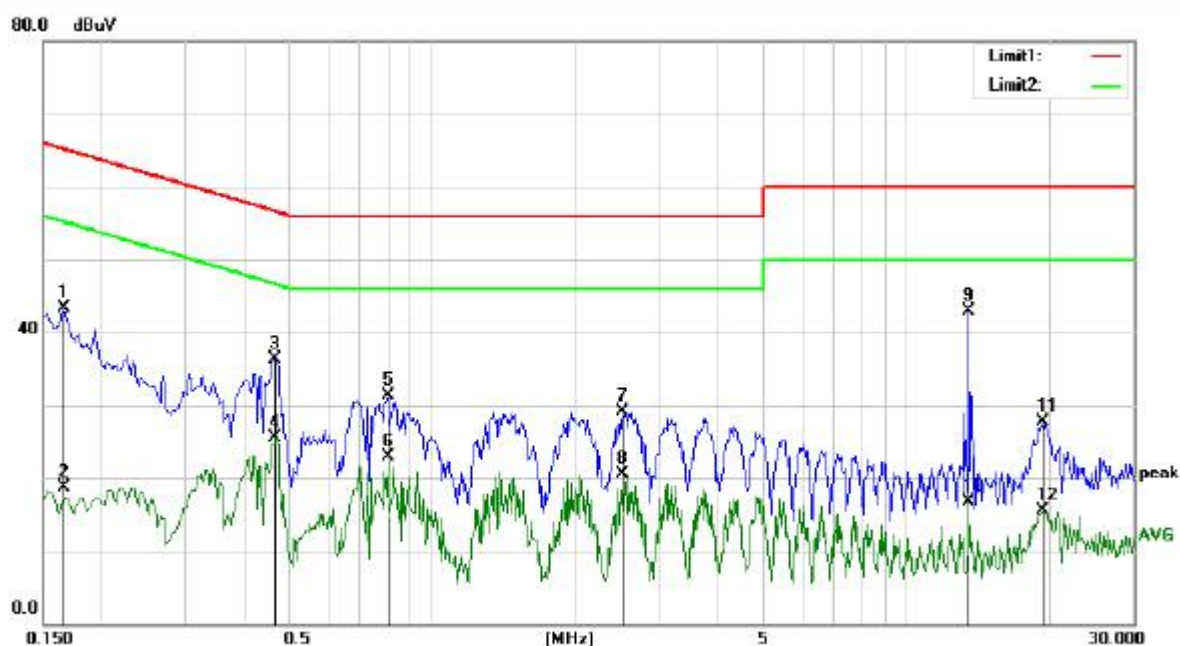
N

Temperature: 24.7

Power: AC 230V/50Hz

Humidity: 38 %

| 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   |     | 0.1620       | 33.60                    | 9.54                    | 43.14                    | 65.36         | -22.22     | QP       |         |
| 2   |     | 0.1620       | 9.19                     | 9.54                    | 18.73                    | 55.36         | -36.63     | AVG      |         |
| 3   |     | 0.4660       | 27.15                    | 9.28                    | 36.43                    | 56.58         | -20.15     | QP       |         |
| 4   |     | 0.4660       | 17.95                    | 9.28                    | 27.23                    | 46.58         | -19.35     | AVG      |         |
| 5   |     | 0.7220       | 21.68                    | 9.32                    | 31.00                    | 56.00         | -25.00     | QP       |         |
| 6   |     | 0.7220       | 12.74                    | 9.32                    | 22.06                    | 46.00         | -23.94     | AVG      |         |
| 7   |     | 2.0140       | 19.83                    | 9.94                    | 29.77                    | 56.00         | -26.23     | QP       |         |
| 8   |     | 2.0140       | 10.39                    | 9.94                    | 20.33                    | 46.00         | -25.67     | AVG      |         |
| 9   |     | 2.5660       | 19.41                    | 9.94                    | 29.35                    | 56.00         | -26.65     | QP       |         |
| 10  |     | 2.5660       | 10.61                    | 9.94                    | 20.55                    | 46.00         | -25.45     | AVG      |         |
| 11  | *   | 13.5900      | 30.62                    | 10.17                   | 40.79                    | 60.00         | -19.21     | QP       |         |
| 12  |     | 13.5900      | 4.08                     | 10.17                   | 14.25                    | 50.00         | -35.75     | AVG      |         |



Site Conduction #1

Phase: **L1**

Temperature: 24.7

Limit: (CE)EN55032 class B\_QP

Power: AC 230V/50Hz

Humidity: 38 %

Mode: NFC Mode

Note:

| 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   |     | 0.1660       | 33.73                    | 9.53                    | 43.26                    | 65.16         | -21.90     | QP       |         |
| 2   |     | 0.1660       | 9.10                     | 9.53                    | 18.63                    | 55.16         | -36.53     | AVG      |         |
| 3   |     | 0.4620       | 27.05                    | 9.28                    | 36.33                    | 56.66         | -20.33     | QP       |         |
| 4   |     | 0.4620       | 16.22                    | 9.28                    | 25.50                    | 46.66         | -21.16     | AVG      |         |
| 5   |     | 0.8020       | 21.82                    | 9.49                    | 31.31                    | 56.00         | -24.69     | QP       |         |
| 6   |     | 0.8020       | 13.41                    | 9.49                    | 22.90                    | 46.00         | -23.10     | AVG      |         |
| 7   |     | 2.5100       | 19.07                    | 9.94                    | 29.01                    | 56.00         | -26.99     | QP       |         |
| 8   |     | 2.5100       | 10.50                    | 9.94                    | 20.44                    | 46.00         | -25.56     | AVG      |         |
| 9   | *   | 13.5340      | 32.67                    | 10.17                   | 42.84                    | 60.00         | -17.16     | QP       |         |
| 10  |     | 13.5340      | 6.46                     | 10.17                   | 16.63                    | 50.00         | -33.37     | AVG      |         |
| 11  |     | 19.3220      | 17.46                    | 10.17                   | 27.63                    | 60.00         | -32.37     | QP       |         |
| 12  |     | 19.3220      | 5.36                     | 10.17                   | 15.53                    | 50.00         | -34.47     | AVG      |         |

## 8 ANTENNA APPLICATION

### 8.1.1 Antenna Requirement

| Standard            | Requirement  |
|---------------------|--|
| FCC CRF Part 15.203 | An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded. |

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### 8.1.2 Result

The EUT'S antenna is Induction coil antenna, The antenna's gain is 0.5dBi and meets the requirement. and the antenna can't be replaced by the user, which in accordance to section 15.203.