



EMC TEST REPORT

Report No.: SET2021-05626

Product Name: Pulse Oximeter

FCC ID: 2ABOGCMS50DL

Model No. : CMS50DL

Applicant: Contec Medical Systems Co., Ltd.

Address: No. 112 Qinhuang West Street, Qinhuangdao, China

Dates of Testing: 2021.04.20 —2021.05.11

Issued by: CCIC Southern Testing Co., Ltd.

Lab Location: Electronic Testing Building, No. 43 Shahe Road, Xili Street,
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Test Report

Product Name..... Pulse Oximeter

Model No. CMS50DL

Trade name **CONTEC™**

Brand name **CONTEC™**

Applicant..... Contec Medical Systems Co., Ltd.

Applicant Address..... No. 112 Qinhuang West Street, Qinhuangdao, China

Manufacturer Contec Medical Systems Co., Ltd.

Manufacturer Address No. 112 Qinhuang West Street, Qinhuangdao, China

Test Standards..... 47 CFR Part 15 Subpart B

Test Result..... PASS

Tested by Zhang Pei Sen

PeiSen Zhang Test Engineer

2021.05.11

Reviewed by Chris You

Chris You Senior Engineer

2021.05.11

Approved by Shuangwen Zhang

Shuangwen Zhang, Manager

2021.05.11



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| Change History | | |
|----------------|------------|-------------------|
| Issue | Date | Reason for change |
| 1.0 | 2021.05.11 | First edition |
| | | |
| | | |



1. GENERAL INFORMATION

1.1 EUT Description

EUT Name : Pulse Oximeter

Trade Name..... : **CONTEC™**

Brand Name..... : **CONTEC™**

Hardware Version..... : N/A

Software Version : N/A

*Note 1:*The EUT is a Pulse Oximeter;

*Note 2:*For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart B:

| No. | Identity | Document Title |
|-----|-----------------------------|-------------------------|
| 1 | 47 CFR Part 15 Subpart B | Radio Frequency Devices |

Test detailed items/section required by FCC rules and results are as below:

| No. | Section | Description | Result |
|-----|---------|--------------------|--------|
| 1 | 15.107 | Conducted Emission | N/A |
| 2 | 15.109 | Radiated Emission | PASS |

NOTE:

(1) The EUT has been tested according to 47 CFR Part 15 Subpart B, Class B. The test procedure is according to ANSI C63.4:2014.



1.3 Facilities and Accreditations

1.3.1 Facilities

FCC-Registration No.: CN1283

CCIC Southern Testing 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. Designation Number: CN1283, valid time is until April 19th, 2021.

ISED Registration: 11185A-1

CCIC Southern Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until June 30th, 2021.

A2LA Code: 5721.01

CCIC-SET is a third party testing organization accredited by A2LA according to ISO/IEC 17025. The accreditation certificate number is 5721.01.

1.3.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

| | |
|-----------------------------|---------------|
| Temperature (°C): | 15 °C - 35 °C |
| Relative Humidity (%): | 25% -75% |
| Atmospheric Pressure (kPa): | 86kPa-106kPa |

1.3.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

| | |
|---|--------------------|
| Uncertainty of Conducted Emission: | Uc = 2.6 dB (k=2) |
| Uncertainty of Radiated Emission: (30MHz~1GHz) | Uc = 3.91 dB (k=2) |
| Uncertainty of Radiated Emission: (1~18GHz) | Uc = 4.5 dB (k=2) |
| Uncertainty of Radiated Emission: (18~40GHz) | Uc = 4.9 dB (k=2) |



2. TEST CONDITIONS SETTING

2.1 Test Peripherals

The following is a listing of the EUT and peripherals utilized during the performance of EMC test:

Support Equipment:

| Description | Brand name | Model | Serial No. | FCCID |
|-------------|------------|-------|------------|-------|
| / | / | / | / | / |

2.2 Use of Software Checklist

| Software | Version number | Manufacturer | Use the project |
|----------|-----------------|---------------|-------------------------------|
| ES-K1 | V1.73 | ROHDE&SCHWARZ | Radiated Emissions below 1GHz |
| TS+ | JS32-RE 2.5.2.0 | Tonsceng | Radiated Emissions above 1GHz |

2.3 Test Mode

The EUT have the following typical setups during the test:

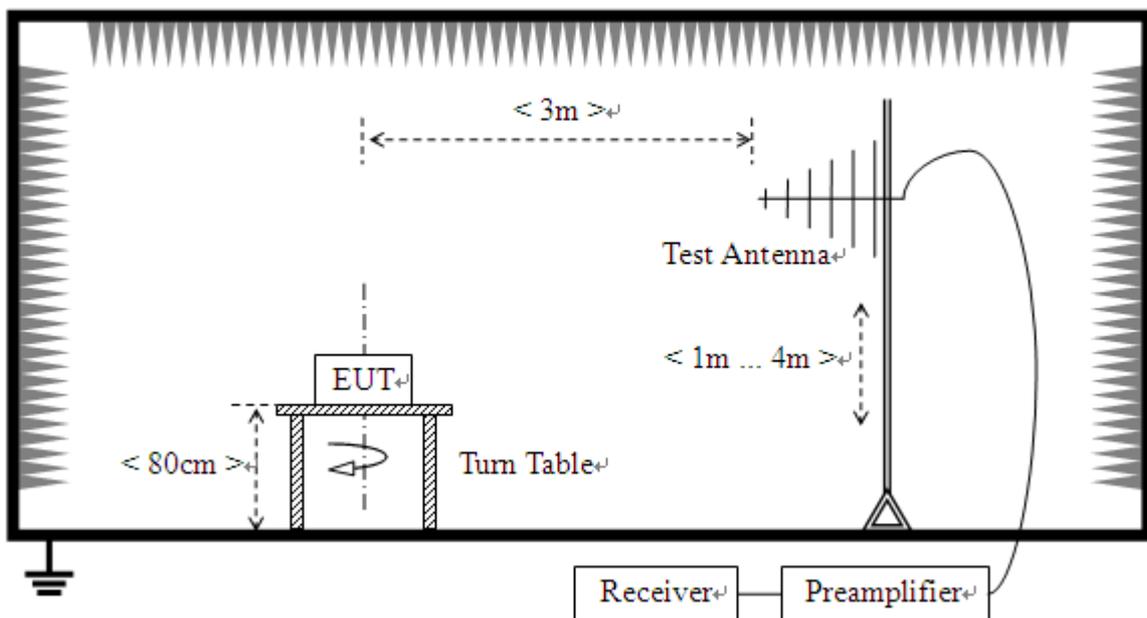
Setup1: EUT working.

2.4 Test Setup and Equipments List

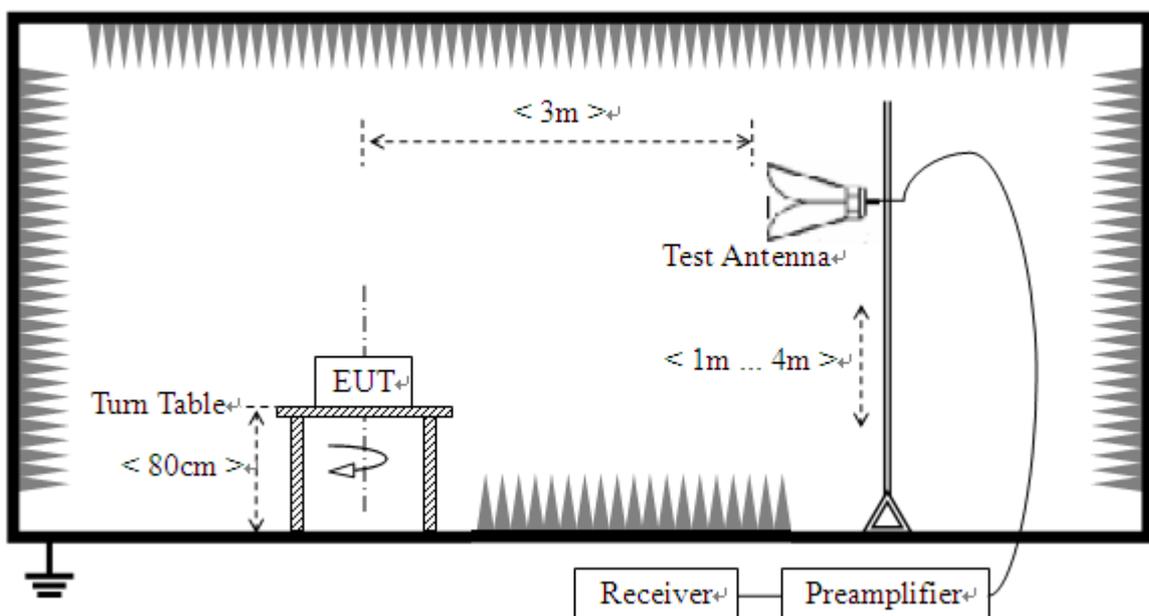
2.4.1 Radiated Emission

A. Test Setup:

- 1) For radiated emissions from 30MHz to 1GHz



- 2) For radiated emissions above 1GHz





B. Test Procedure

The test is performed in a 3m Semi-Anechoic Chamber; the antenna factor, cable loss and so on of the site (factors) is calculated to correct the reading. The EUT is placed on a 0.8m high insulating Turn Table, and keeps 3m away from the Test Antenna, which is mounted on a variable-height antenna master tower.

For the test Antenna:

- 1) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

C. Equipments List:

| Description | Manufacturer | Model | Serial No. | Calibration Date | Calibration Due. Date |
|---------------------|-------------------|---------------------------|------------|------------------|-----------------------|
| Test Receiver | KEYSIGHT | N9038A | A141202036 | 2020.11.21 | 2021.09.20 |
| LISN | ROHDE&SCHWARZ | ENV216 | A140701847 | 2020.11.21 | 2021.09.21 |
| Shield Room | Xinju Electronics | L7300*W4500 *H3100 | A181003226 | 2018.09.06 | 2021.09.05 |
| EMI Test Receiver | ROHDE&SCHWARZ | ESIB7 | A0501375 | 2020.06.24 | 2021.06.23 |
| Broadband Ant. | 2786 | ETC | A150402239 | 2018.09.17 | 2021.09.16 |
| 3M Anechoic Chamber | Albatross | SAC-3MAC 9*6*6m | A0412375 | 2019.03.26 | 2023.03.25 |
| EMI Test Receiver | ROHDE&SCHWARZ | ESW26 | A180502935 | 2020.10.21 | 2021.08.12 |
| System Simulator | ROHDE&SCHWARZ | CMW500 | A150802214 | 2019.07.30 | 2021.07.29 |
| 5M Anechoic Chamber | Albatross | SAC-5MAC 12.8x6.8x6.4m | A0304210 | 2019.03.25 | 2023.03.24 |
| EMI Horn Ant. | ROHDE&SCHWARZ | HF906 | A0304225 | 2019.04.17 | 2022.04.17 |

RADIATED EMISSION

2.4.2 Requirement

According to FCC section 15.109, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

| Frequency range (MHz) | Field Strength | | Field Strength Limitation at 3m Measurement Dist | |
|-----------------------|----------------|------|--|-----------|
| | μV/m | Dist | (uV/m) | (dBuV/m) |
| 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 |

- a) As shown in FCC section 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.
- b) Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.
- c) For below 1G :QP detector RBW 120kHz ,VBW 300kHz.
- d) For Above 1G: PK detector RBW 1MHz,VBW 3MHz for PK value ;AV detector RBW 1MHz, VBW 10Hz for AV value.

Note:

- 1) The tighter limit shall apply at the boundary between two frequency range.
- 2) Limitation expressed in dBuV/m is calculated by $20\log$ Emission Level(uV/m).
- 3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of $Ld1 = Ld2 * (d2/d1)^2$.

Example:

F.S Limit at 30m distance is 30uV/m, then F.S Limitation at 3m distance is adjusted as

$$Ld1 = L1 = 30\text{uV/m} * (10)^2 = 100 * 30\text{uV/m}.$$

2.4.3 Test Description

See section 2.3.2 of this report.



2.4.4 Test Result

The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors. Both the vertical and the horizontal polarizations of the Test Antenna are considered to perform the tests. All test modes are considered, refer to recorded points and plots below.

The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

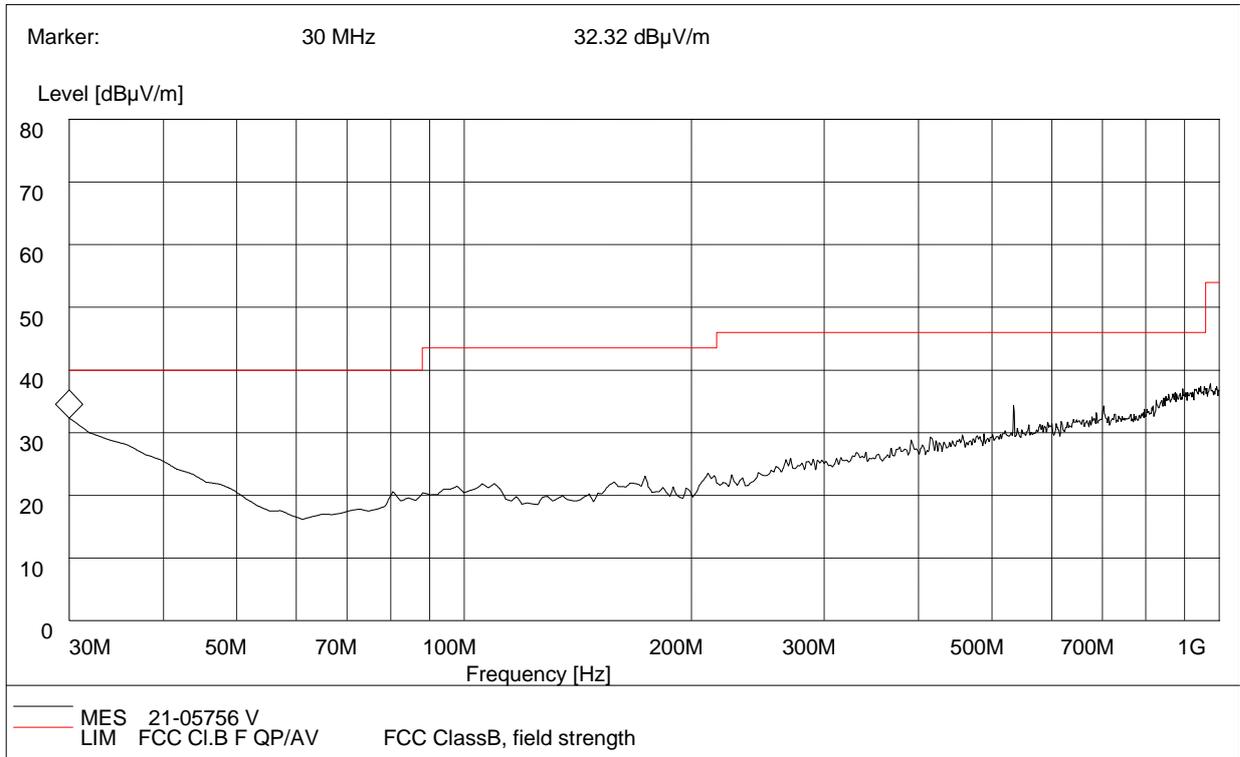
Note: All radiated emission tests were performed in X, Y, Z axis direction, and only the worst axis test condition was recorded in this test report.

-Emission Level(dBuV/m)= 20log Emission Level(uV/m)

-Corrected Reading=Antenna factor+Cable Loss+Read Level-Preamp Factor= Level



A.Radiation disturbances, antenna polarization:Vertical

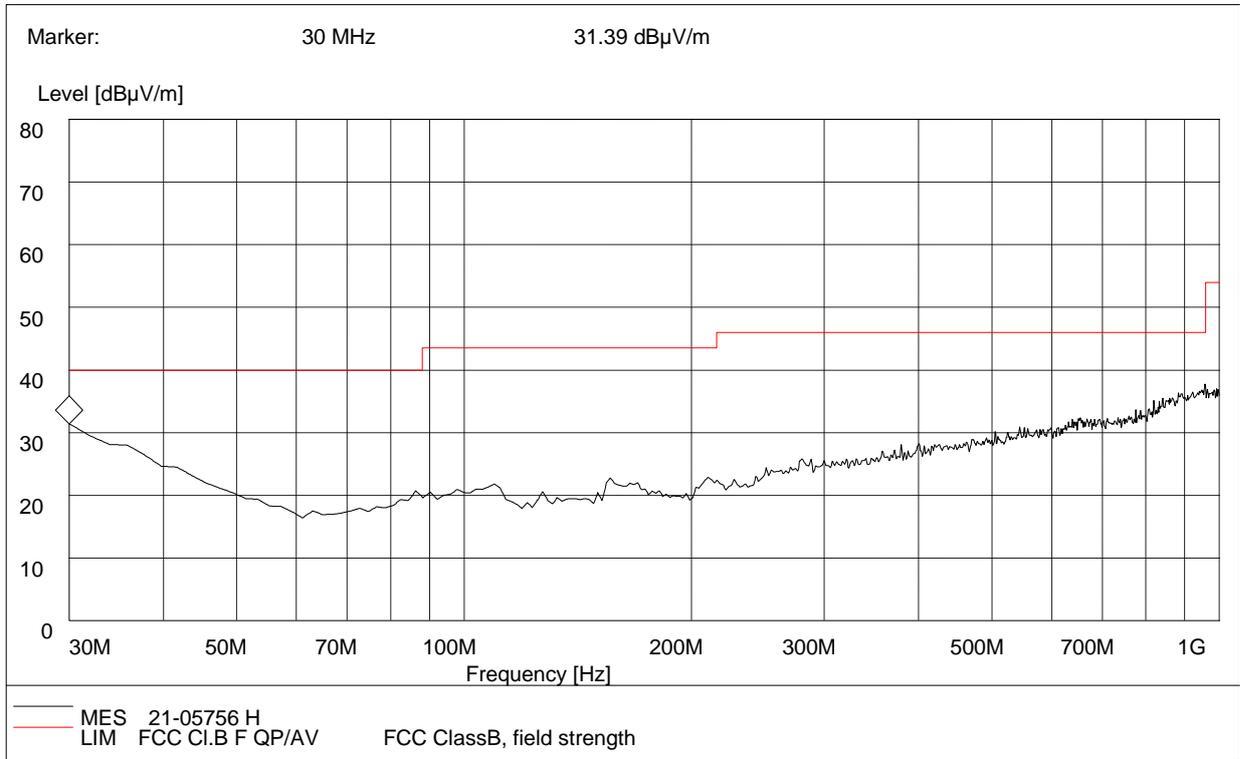


(Plot C: Test Antenna Vertical 30M - 1G)

| Frequency (MHz) | QuasiPeak (dBµV/m) | Bandwidth (kHz) | Antenna height (cm) | Limit (dBµV/m) | Margin (dB) | Antenna | Cable Loss(dB) | ANT. Factor(dB) | Verdict |
|-----------------|--------------------|-----------------|---------------------|----------------|-------------|----------|----------------|-----------------|---------|
| 30.00 | 31.28 | 120 | 100 | 40.0 | 8.72 | Vertical | 0.4 | 26.3 | Pass |
| 35.81 | 27.64 | 120 | 100 | 40.0 | 12.36 | Vertical | 0.6 | 26.3 | Pass |
| 80.44 | 19.08 | 120 | 100 | 40.0 | 20.92 | Vertical | 0.5 | 26.3 | Pass |
| 173.54 | 21.93 | 120 | 100 | 43.5 | 21.57 | Vertical | 0.7 | 27.0 | Pass |
| 210.41 | 23.54 | 120 | 100 | 43.5 | 19.96 | Vertical | 0.5 | 28.0 | Pass |
| 534.14 | 32.93 | 120 | 100 | 46.0 | 13.07 | Vertical | 1.1 | 28.9 | Pass |



B.Radiation disturbances, antenna polarization: Horizontal

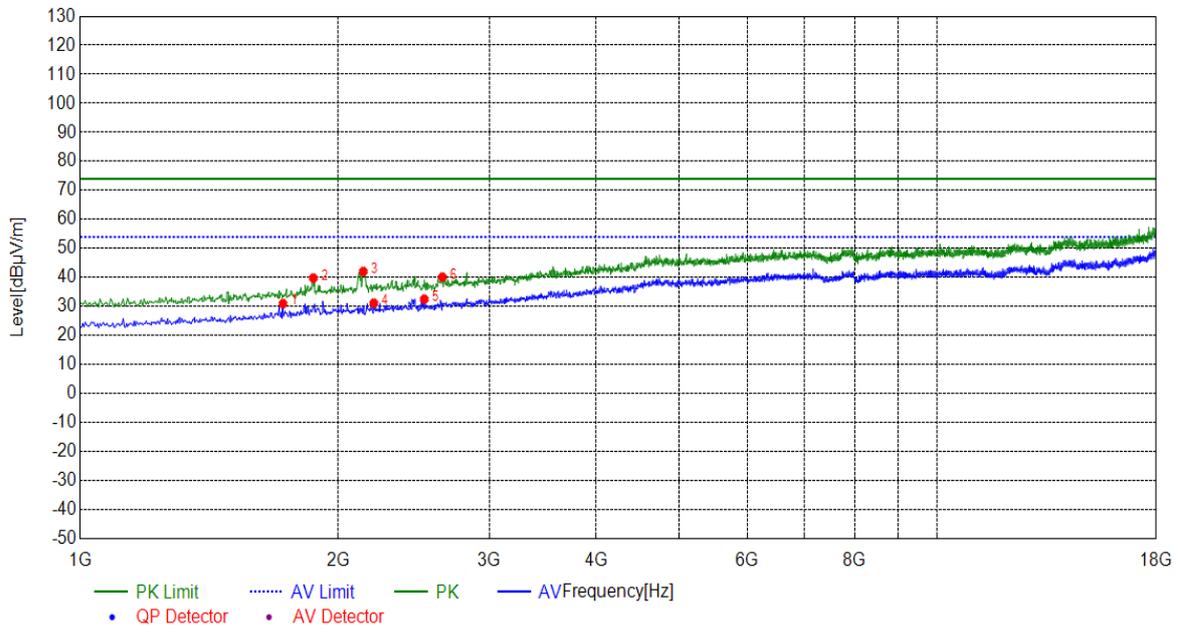


(Plot D: Test Antenna Horizontal 30M - 1G)

| Frequency (MHz) | QuasiPeak (dBµV/m) | Bandwidth (kHz) | Antenna height (cm) | Limit (dBµV/m) | Margin (dB) | Antenna | Cable Loss(dB) | ANT. Factor(dB) | Verdict |
|-----------------|--------------------|-----------------|---------------------|----------------|-------------|------------|----------------|-----------------|---------|
| 30.00 | 30.58 | 120 | 100 | 40.0 | 9.42 | Horizontal | 0.5 | 26.3 | Pass |
| 35.18 | 26.94 | 120 | 100 | 40.0 | 13.06 | Horizontal | 0.5 | 26.3 | Pass |
| 86.25 | 20.58 | 120 | 100 | 40.0 | 19.42 | Horizontal | 0.6 | 27.0 | Pass |
| 109.51 | 20.69 | 120 | 100 | 43.5 | 22.81 | Horizontal | 0.6 | 27.0 | Pass |
| 156.10 | 22.93 | 120 | 100 | 43.5 | 20.57 | Horizontal | 0.6 | 28.0 | Pass |
| 210.41 | 20.96 | 120 | 100 | 43.5 | 22.54 | Horizontal | 1.2 | 28.9 | Pass |

Test Result: PASS

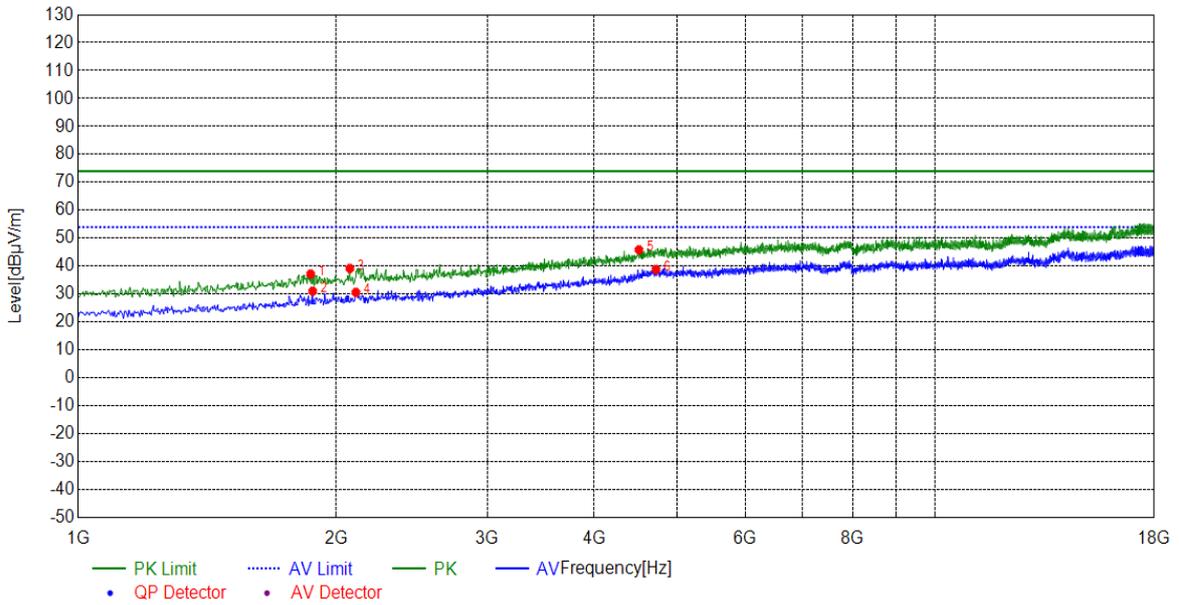
A.Radiation disturbances, antenna polarization: Horizontal



(Plot E: Test Antenna Horizontal 1G – 18G)

| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|----------------|-------------|----------------|-------------|-------------|-----------|------------|
| 1 | 1724.34 | 31.01 | -12.45 | 54.00 | 22.99 | 100 | 30 | Horizontal |
| 2 | 1870.57 | 39.81 | -11.63 | 74.00 | 34.19 | 100 | 10 | Horizontal |
| 3 | 2139.22 | 42.08 | -10.56 | 74.00 | 31.92 | 100 | 20 | Horizontal |
| 4 | 2200.44 | 31.14 | -10.34 | 54.00 | 22.86 | 100 | 20 | Horizontal |
| 5 | 2520.10 | 32.53 | -9.18 | 54.00 | 21.47 | 100 | 20 | Horizontal |
| 6 | 2645.92 | 40.13 | -8.66 | 74.00 | 33.87 | 100 | 10 | Horizontal |

B.Radiation disturbances, antenna polarization: Vertical



(Plot F: Test Antenna Vertical 1G – 18G)

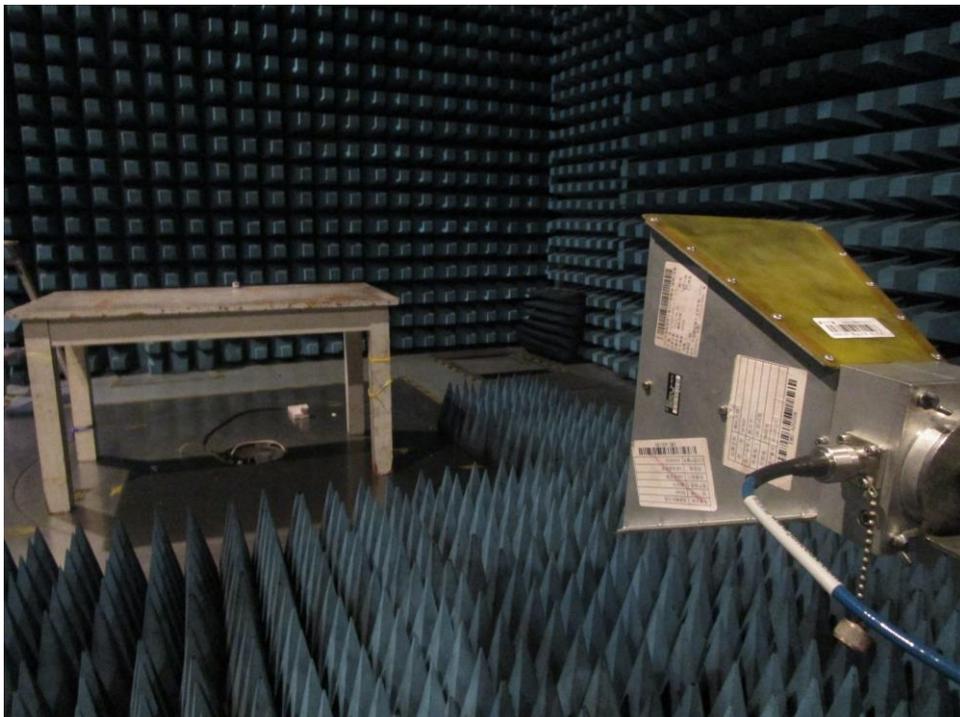
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| 1 | 1867.17 | 37.20 | -11.64 | 74.00 | 36.80 | 100 | 20 | Vertical |
| 2 | 1877.37 | 31.07 | -11.59 | 54.00 | 22.93 | 100 | 10 | Vertical |
| 3 | 2074.61 | 39.19 | -10.78 | 74.00 | 34.81 | 100 | 10 | Vertical |
| 4 | 2108.62 | 30.63 | -10.68 | 54.00 | 23.37 | 100 | 10 | Vertical |
| 5 | 4509.50 | 45.87 | -1.11 | 74.00 | 28.13 | 100 | 20 | Vertical |
| 6 | 4720.34 | 38.82 | 0.24 | 54.00 | 15.18 | 100 | 20 | Vertical |

Appendix II: Photographs of EMC Test Configuration

1. Radiated Emission Measurement below 1GHz



2. Radiated Emission Measurement above 1GHz



-----End of Report-----