



# EMC TEST REPORT

**Report No.:** SET2021-07860

**Product Name:** Pulse Oximeter

**FCC ID:** 2ABOGCMS50DL1

**Model No. :** CMS50DL1

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

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

**Dates of Testing:** 2021.06.11 —2021.06.24

**Issued by:** CCIC Southern Testing Co., Ltd.

**Lab Location:** Electronic Testing Building, No. 43 Shahe Road, Xili Street,  
Nanshan District, Shenzhen, Guangdong, China.

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### Test Report

Product Name..... Pulse Oximeter

Model No. .... CMS50DL1

Trade name ..... **CONTEC™**

Brand name ..... N/A

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 2021.08.05

Reviewed by ..... Chris You

Chris You Senior Engineer 2021.08.05

Approved by ..... Shuangwen Zhang

Shuangwen Zhang, Manager 2021.08.05



### TABLE OF CONTENTS

- 1. GENERAL INFORMATION .....4**
- 1.1 EUT Description .....4**
- 1.2 Test Standards and Results .....5**
- 1.3 Facilities and Accreditations .....6**
- 1.3.1 Facilities .....6
- 1.3.2 Test Environment Conditions .....6
- 1.3.3 Measurement Uncertainty .....6
- 2. TEST CONDITIONS SETTING .....7**
- 2.1 Test Peripherals .....7**
- 2.2 Use of Software Checklist .....7**
- 2.3 Test Mode .....7**
- 2.4 Test Setup and Equipments List .....8**
- 2.4.1 Conducted Emission .....8
- 2.4.2 Radiated Emission .....8
- 2.4.3 Radiated Emission ..... 11
- 2.4.4 Requirement ..... 11
- 2.4.5 Test Description ..... 11
- 2.4.6 Test Result ..... 12
- APPENDIX I: PHOTOGRAPHS OF EMC TEST CONFIGURATION .....17**

Change History		
Issue	Date	Reason for change
1.0	2021.08.05	First edition



## 1. GENERAL INFORMATION

### 1.1 EUT Description

EUT Name ..... : Pulse Oximeter

Trade Name..... : **CONTEC™**

Brand Name..... : N/A

Hardware Version..... : N/A

Software Version ..... : N/A

Power supply..... : 3V DC(Battery)

*Note1:*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, 2023.

**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 April 20th, 2023.

**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
N/A	N/A	N/A	N/A	N/A

### 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
EMC32	Version 10.35.10	ROHDE&SCHWARZ	Conducted Emission

### 2.3 Test Mode

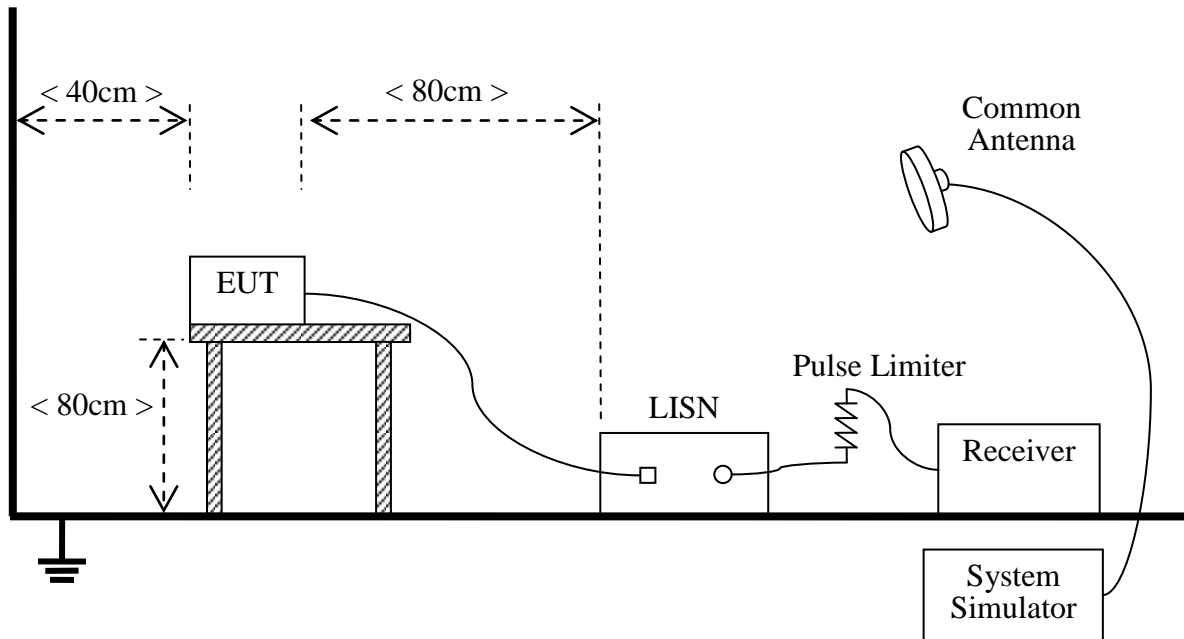
The EUT have the following typical setups during the test:

Setup1: EUT working.

## 2.4 Test Setup and Equipments List

### 2.4.1 Conducted Emission

#### A. Test Setup:



The EUT is placed on a 0.8m high insulating table, which stands on the grounded conducting floor, and keeps 0.4m away from the grounded conducting wall. The EUT is connected to the power mains through a LISN which provides  $50\Omega/50\mu\text{H}$  of coupling impedance for the measuring instrument. The Common Antenna is used for the call between the EUT and the System Simulator (SS). A Pulse Limiter is used to protect the measuring instrument. The factors of the whole test system are calibrated to correct the reading.

#### B. Equipments List:

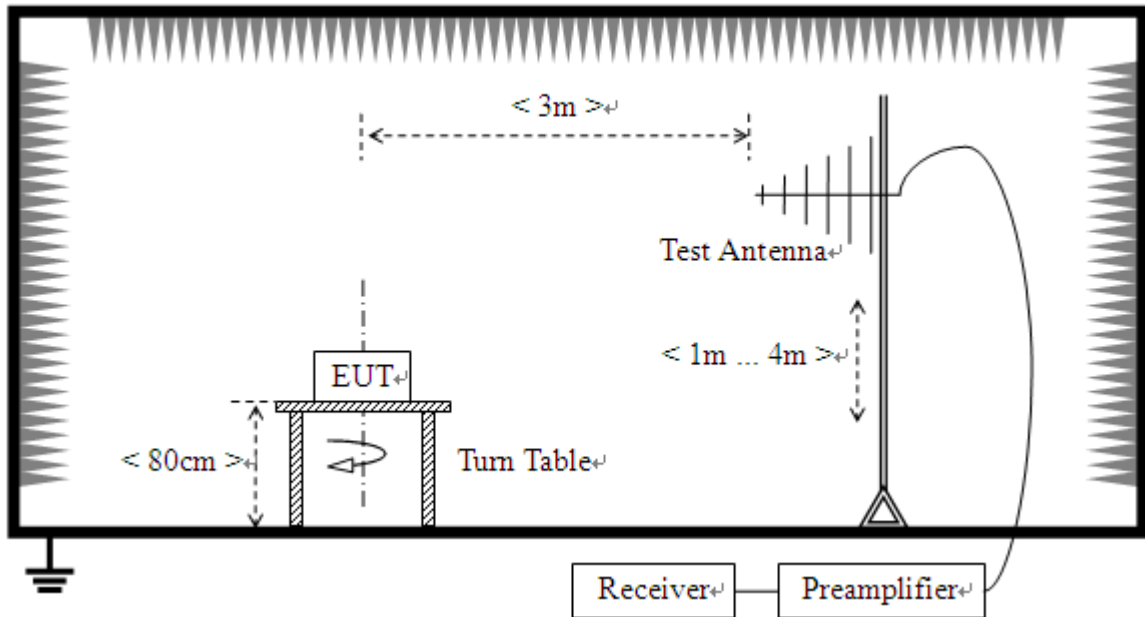
Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due. Date
Test Receiver	KEYSIGHT	N9038A	A141202036	2020.11.21	2021.09.20
LISN	ROHDE&SCHWARZ	ENV216	A140701847	2020.11.21	2021.09.21
Cable	MATCHING PAD	W7	/	2020.08.02	2021.08.01

### 2.4.2 Radiated Emission

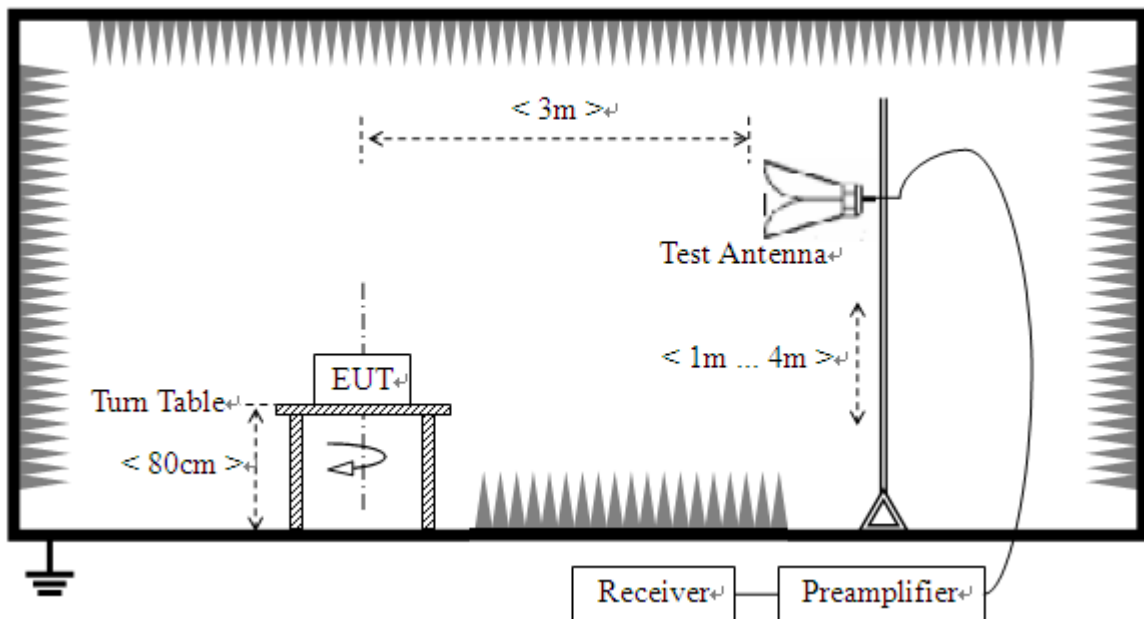
#### A. Test Setup:

- 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	2021.06.23	2022.05.23
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



### 2.4.3 Radiated Emission

### 2.4.4 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	
	$\mu\text{V/m}$	Dist	( $\mu\text{V/m}$ )	( $\text{dBuV/m}$ )
30.0 - 88.0	100	3m	100	$20\log 100$
88.0 - 216.0	150	3m	150	$20\log 150$
216.0 - 960.0	200	3m	200	$20\log 200$
Above 960.0	500	3m	500	$20\log 500$

- 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.
- 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.
- For below 1G :QP detector RBW 120kHz ,VBW 300kHz.
- For Above 1G: PK detector RBW 1MHz,VBW 3MHz for PK value ;AV detector RBW 1MHz, VBW 10Hz for AV value.

**Note:**

- The tighter limit shall apply at the boundary between two frequency range.
- Limitation expressed in  $\text{dBuV/m}$  is calculated by  $20\log$  Emission Level( $\mu\text{V/m}$ ).
- 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  $30\mu\text{V/m}$ , then F.S Limitation at 3m distance is adjusted as

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

### 2.4.5 Test Description

See section 2.3.2 of this report.



#### 2.4.6 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.

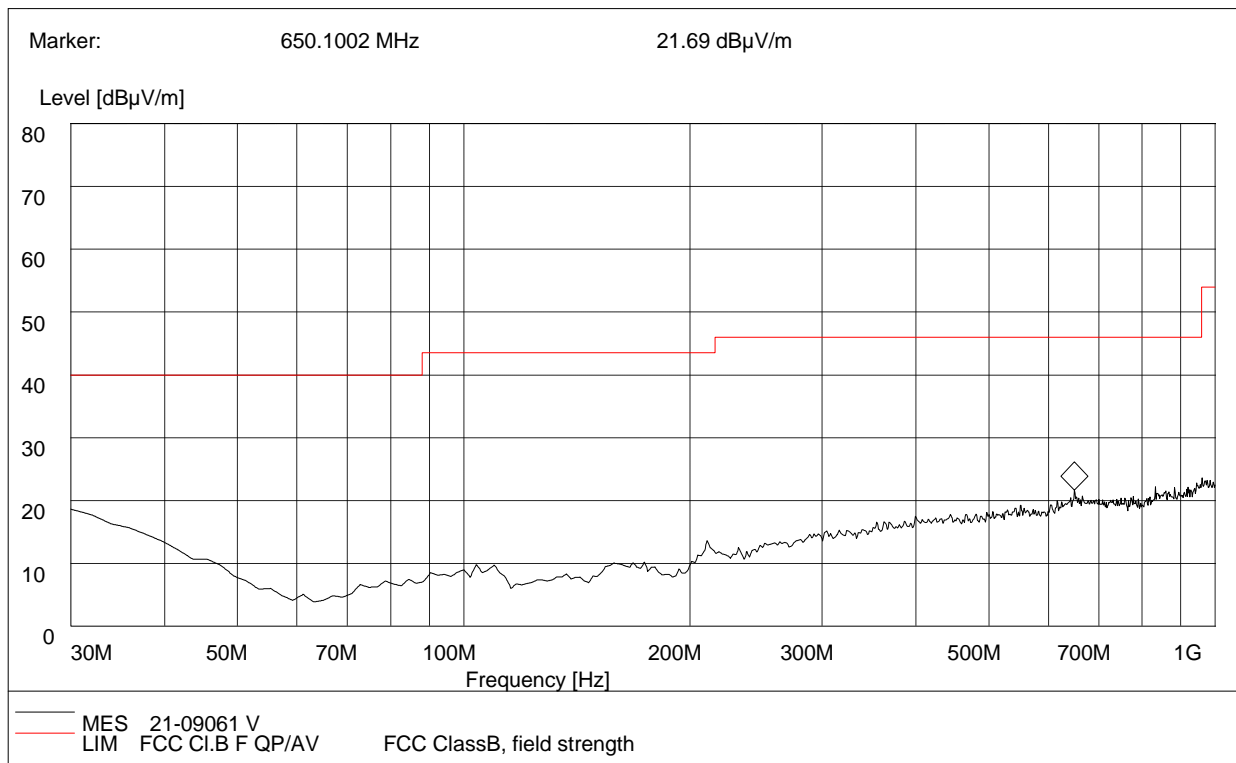
Note: All radiated emission tests were performed in X, Y, Z axis direction, and only the worst axis test condition was recorded in this test report.

-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**

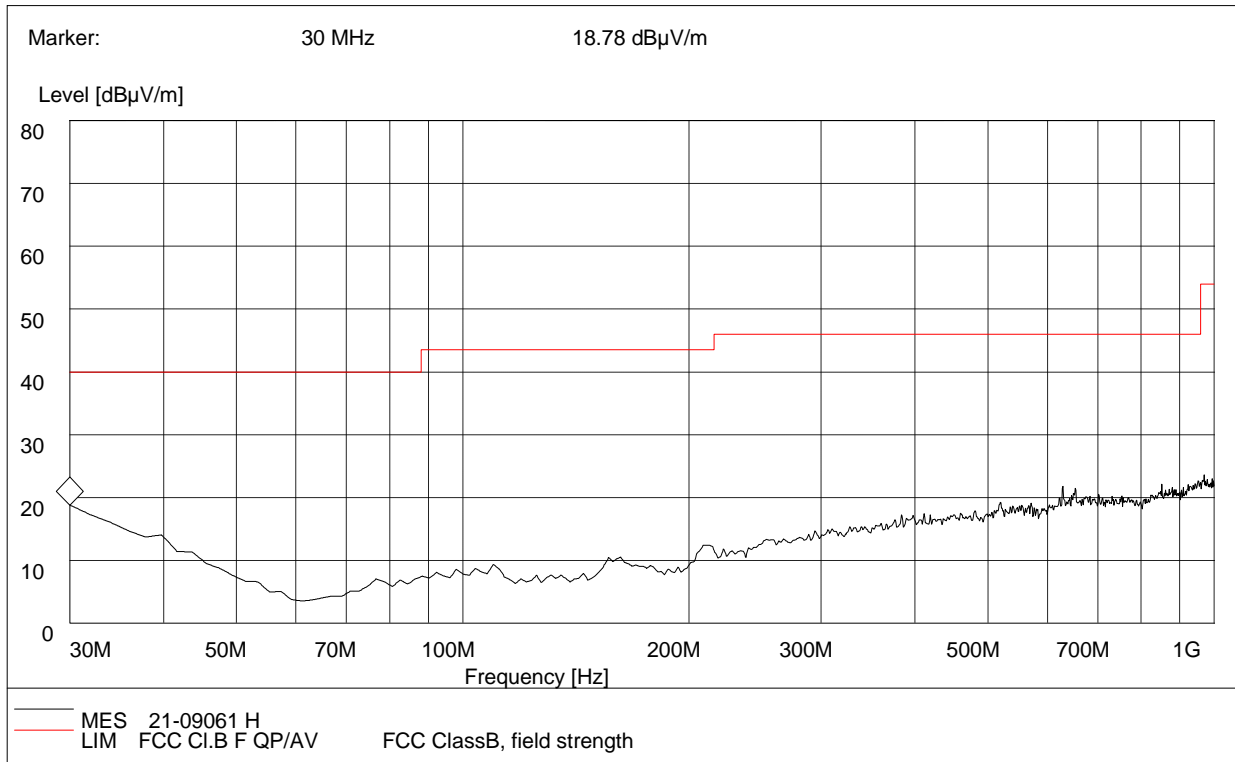


(Plot C: Test Antenna Vertical 30M - 1G)

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	17.10	120	100	40.0	22.90	Vertical	0.4	26.1	Pass
45.55	9.10	120	100	40.0	30.90	Vertical	0.5	26.2	Pass
103.86	7.65	120	100	43.5	35.85	Vertical	0.5	26.1	Pass
210.78	11.60	120	100	43.5	31.90	Vertical	0.5	26.5	Pass
354.62	15.20	120	100	46.0	30.80	Vertical	0.5	27.4	Pass
650.10	19.10	120	100	46.0	26.90	Vertical	1.0	27.9	Pass



**B.Radiation disturbances, antenna polarization: Horizontal**



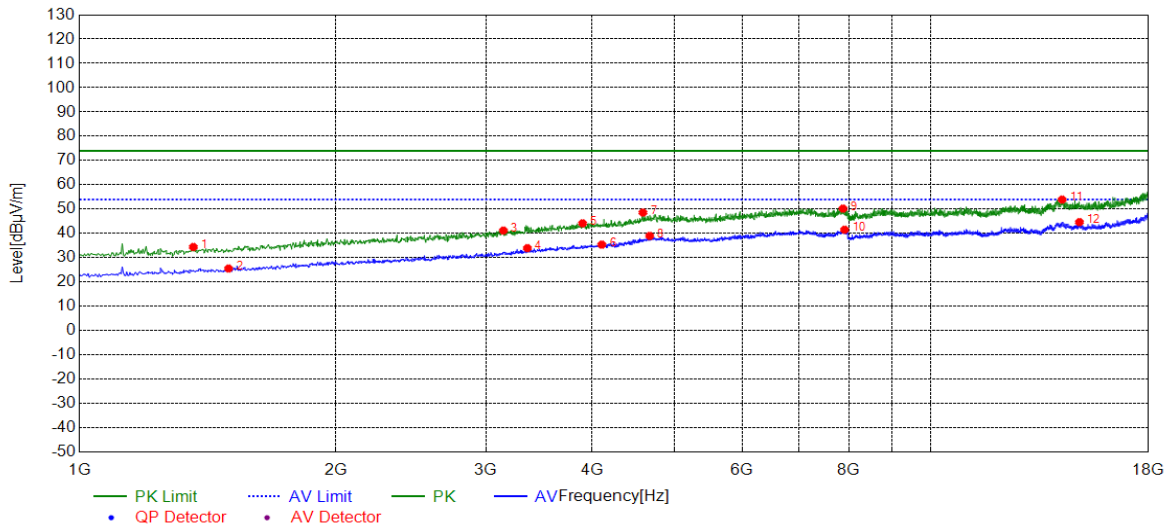
(Plot D: Test Antenna Horizontal 30M - 1G)

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	16.70	120	100	40.0	23.30	Horizontal	0.5	26.1	Pass
39.71	13.50	120	100	40.0	26.50	Horizontal	0.5	26.2	Pass
76.00	6.30	120	100	40.0	33.70	Horizontal	0.5	26.3	Pass
156.35	9.40	120	100	43.5	34.10	Horizontal	0.6	26.5	Pass
208.83	10.10	120	100	43.5	33.40	Horizontal	0.6	27.0	Pass
628.71	19.80	120	100	46.0	26.20	Horizontal	1.0	28.0	Pass

**Test Result: PASS**



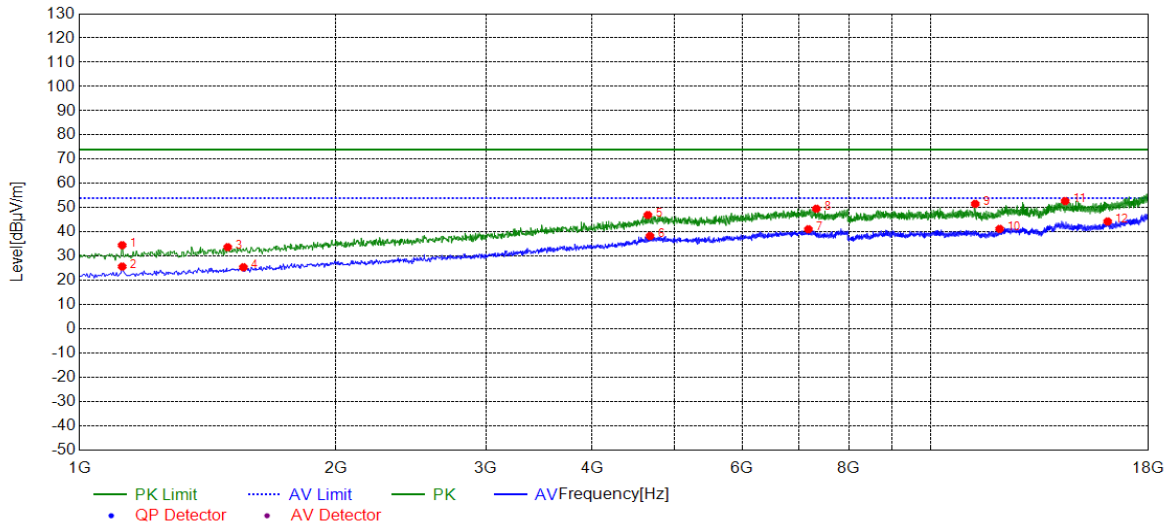
**A.Radiation disturbances, antenna polarization: Horizontal**



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

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Height [cm]	Angle [°]	Polarity
1	1360.47	34.42	-14.15	74.00	39.58	PK	100	20	Horizontal
2	1496.49	25.55	-13.57	54.00	28.45	AV	100	100	Horizontal
3	3145.82	41.18	-6.62	74.00	32.82	PK	100	60	Horizontal
4	3356.67	33.95	-5.55	54.00	20.05	AV	100	190	Horizontal
5	3897.37	44.16	-3.64	74.00	29.84	PK	100	70	Horizontal
6	4104.82	35.39	-2.80	54.00	18.61	AV	100	90	Horizontal
7	4587.71	48.59	-0.44	74.00	25.41	PK	100	170	Horizontal
8	4672.73	38.98	0.03	54.00	15.02	AV	100	50	Horizontal
9	7879.57	50.21	3.94	74.00	23.79	PK	100	160	Horizontal
10	7913.58	41.52	3.95	54.00	12.48	AV	100	30	Horizontal
11	14249.0	53.93	10.76	74.00	20.07	PK	100	160	Horizontal
12	14932.5	44.67	10.30	54.00	9.33	AV	100	30	Horizontal

**B.Radiation disturbances, antenna polarization: Vertical**



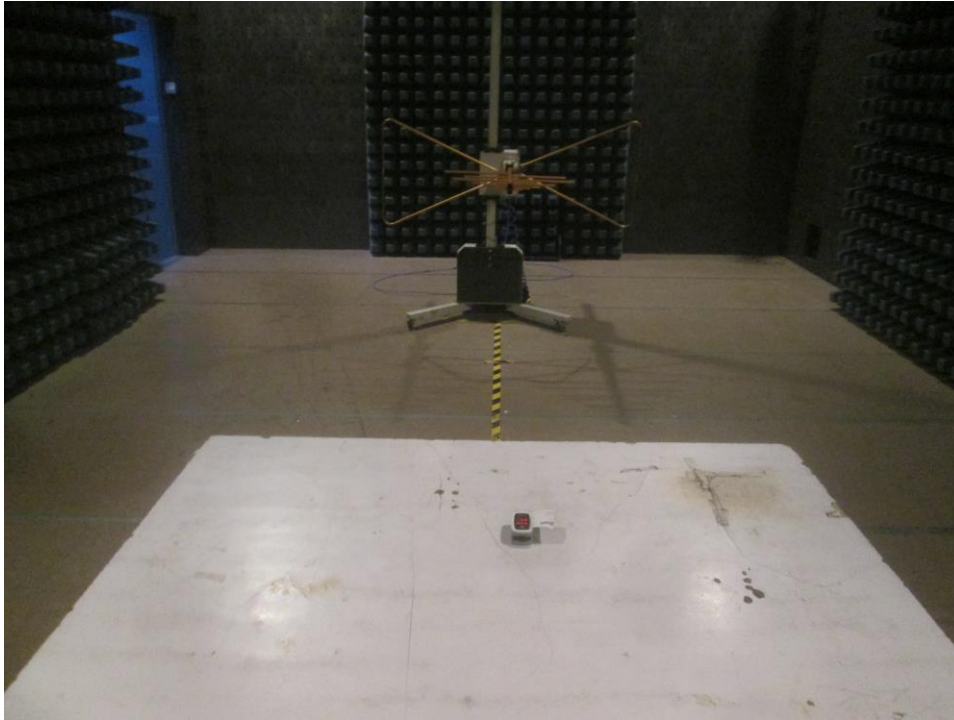
(Plot F: Test Antenna Vertical 1G – 18G)

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Height [cm]	Angle [°]	Polarity
1	1122.42	34.54	-15.07	74.00	39.46	PK	100	20	Vertical
2	1122.42	25.74	-15.07	54.00	28.26	AV	100	10	Vertical
3	1493.09	33.74	-13.59	74.00	40.26	PK	100	20	Vertical
4	1557.71	25.45	-13.25	54.00	28.55	AV	100	10	Vertical
5	4648.92	46.99	-0.09	74.00	27.01	PK	100	30	Vertical
6	4676.13	38.32	0.05	54.00	15.68	AV	100	20	Vertical
7	7175.63	41.13	3.57	54.00	12.87	AV	100	20	Vertical
8	7332.06	49.59	3.23	74.00	24.41	PK	100	30	Vertical
9	11266.6	51.60	6.25	74.00	22.40	PK	100	20	Vertical
10	12035.2	41.26	6.71	54.00	12.74	AV	100	30	Vertical
11	14368.0	52.74	10.55	74.00	21.26	PK	100	20	Vertical
12	16116.0	44.32	11.41	54.00	9.68	AV	100	20	Vertical

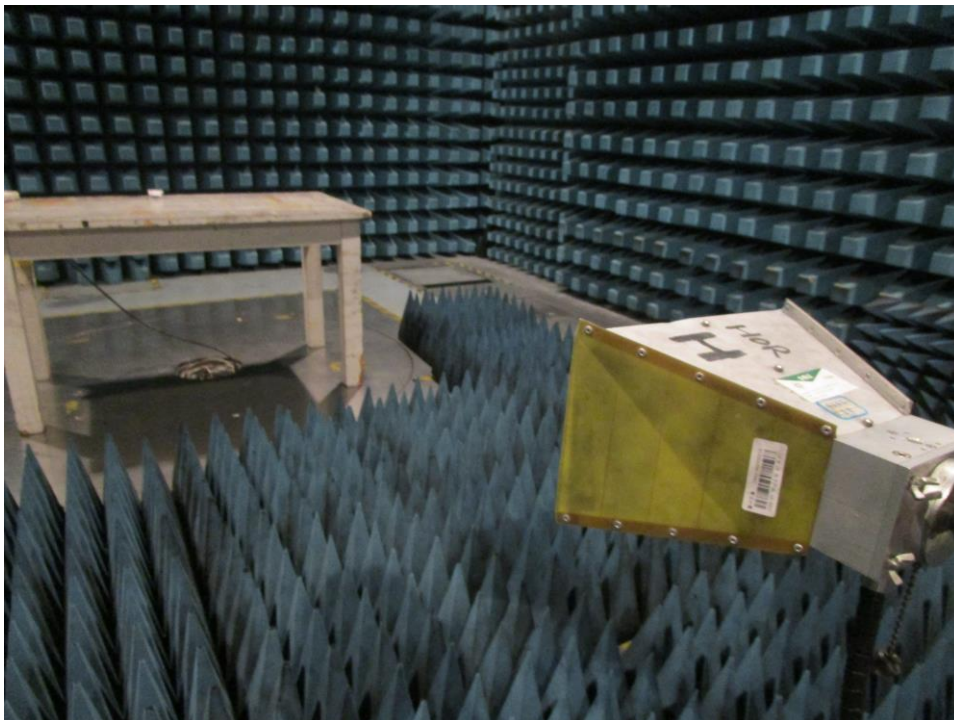


## Appendix I: Photographs of EMC Test Configuration

### 1. Radiated Emission Measurement below 1GHz



### 2. Radiated Emission Measurement above 1GHz



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