



EMC TEST REPORT

Report No.: SET2022-04782

Product Name: Pulse Oximeter

FCC ID: 2ABOGCMS60D1

Model No. : CMS60D1

Applicant: Contec Medical Systems Co., Ltd.

Address: No.112 Qinhuang West Street, Economic & Technical Development Zone, Qinhuangdao, Hebei Province, PEOPLE'S REPUBLIC OF CHINA

Dates of Testing: 2022.03.02-2022.04.27

Issued by: CCIC Southern Testing Co., Ltd.

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

Tel: 86 755 26627338 Fax: 86 755 26627238

This test report consists of **20** pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by CCIC-SET. The test results in the report only apply to the tested sample. The test report shall be invalid without all the signatures of testing engineers, reviewer and approver. Any objections must be raised to CCIC-SET within 15 days since the date when the report is received. It will not be taken into consideration beyond this limit.



Test Report

Product Name..... Pulse Oximeter
Model No. CMS60D1
Trade name **CONTEC™**
Brand name **CONTEC™**
Applicant..... Contec Medical Systems Co., Ltd.
Applicant Address..... No.112 Qinhuang West Street, Economic & Technical
Development Zone, Qinhuangdao, Hebei Province, PEOPLE'S
REPUBLIC OF CHINA
Manufacturer Contec Medical Systems Co., Ltd.
Manufacturer Address .. No.112 Qinhuang West Street, Economic & Technical
Development Zone, Qinhuangdao, Hebei Province, PEOPLE'S
REPUBLIC OF CHINA
Test Standards..... 47 CFR Part 15 Subpart B
Test Result..... PASS
Tested by Ruihong Xie
Ruihong Xie Test Engineer 2022.04.27
Reviewed by Chris You
Chris You Senior Engineer 2022.04.27
Approved by Shuangwen Zhang
Shuangwen Zhang, Manager 2022.04.27

**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
3.	47 CFR PART 15B REQUIREMENTS	11
3.1	Conducted Emission	11
3.1.1	Requirement	11
3.1.2	Test Description	11
3.1.3	Test Result	11
	Radiated Emission	14
3.1.4	Requirement	14
3.1.5	Test Description	14
3.1.6	Test Result	15

Change History		
Issue	Date	Reason for change
1.0	2022.04.27	First edition



1. GENERAL INFORMATION

1.1 EUT Description

EUT Name : Pulse Oximeter
Trade Name..... : **CONTEC™**
Brand Name..... : **CONTEC™**
Hardware Version..... : 2.0
Software Version..... : 2.0
Power supply..... : Battery
Model No.: BP1S1P
Rated Voltage:3.7V, 2200mAh
Manufacturer : Contec Medical Systems Co., Ltd.
Ancillary Equipment..... : AC Adapter
Model No.: CMS105-5US
I/p: 100-240V~50/60Hz ,150mA
O/p: 5.0V 1000 mA
Manufacturer : Contec Medical Systems Co., Ltd.

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	PASS
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 June 30th, 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 = 3.2 dB (k=2)
Uncertainty of Radiated Emission: (30MHz~1GHz)	Uc = 5.8 dB (k=2)
Uncertainty of Radiated Emission: (1~6GHz)	Uc = 5.1 dB (k=2)
Uncertainty of Radiated Emission: (6~18GHz)	Uc = 5.5 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
/	/	/	/	/

Support Cable:

Description	Shield Type	Ferrite Core	Length
Antenna Cable	Un- shielding	No	1.2m

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+ Charger

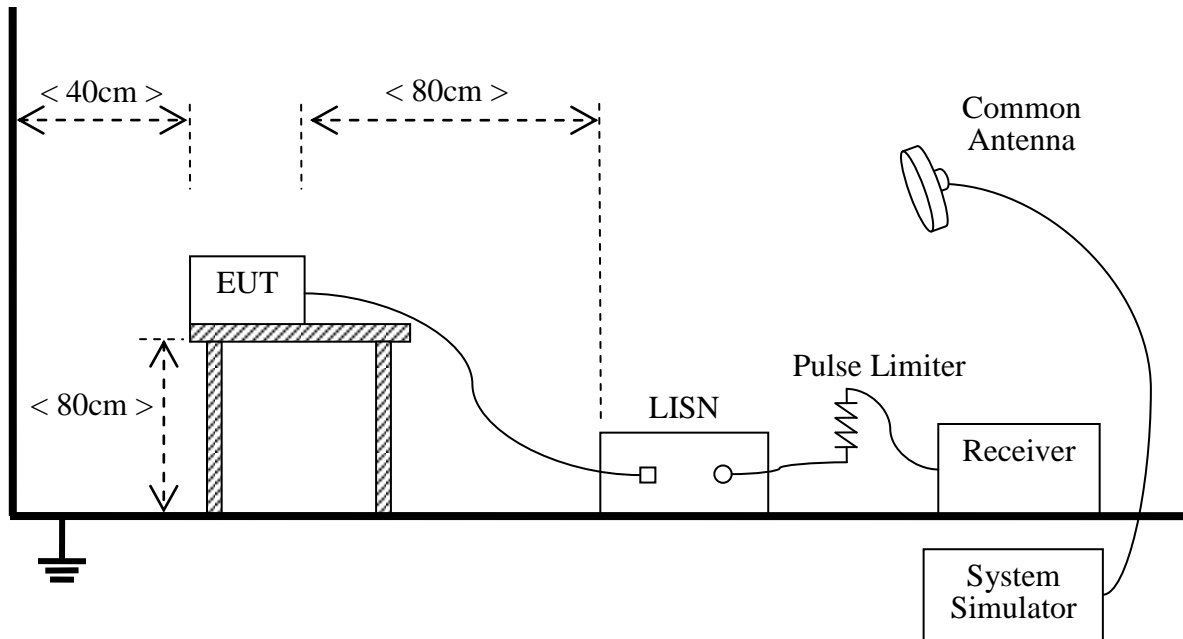
Setup2: EUT working+ Battery

Note: only worst-case mode setup 1 mode data provide at the report

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.

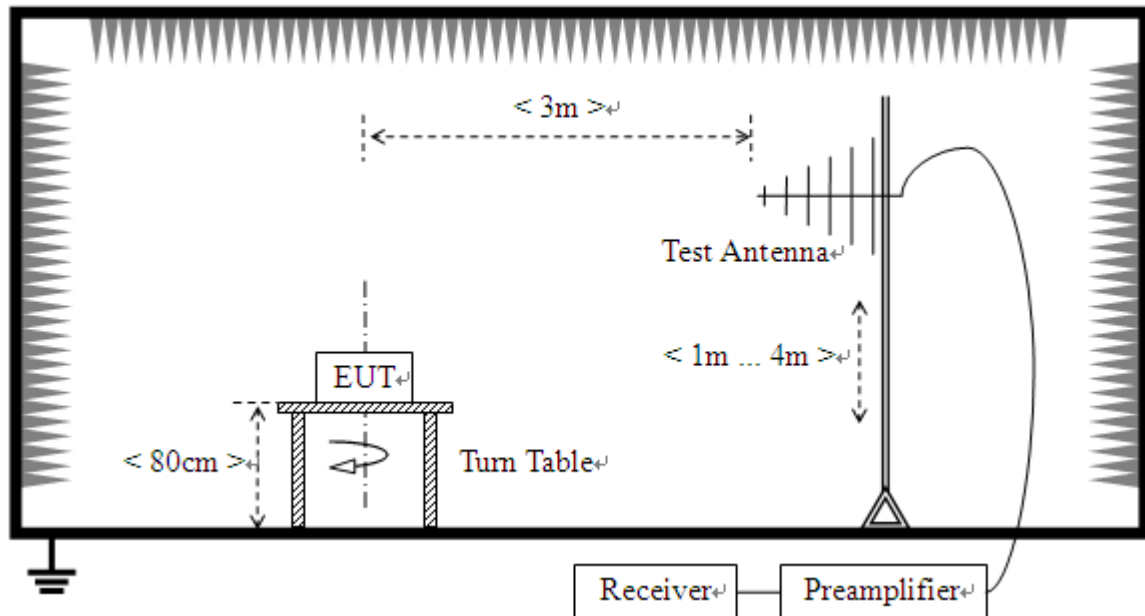
B. Equipments List:

Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due. Date
Test Receiver	KEYSIGHT	N9038A	A141202036	2021.09.20	2022.08.04
LISN	ROHDE&SCHWARZ	ENV216	A140701847	2021.09.21	2022.08.02
Cable	MATCHING PAD	W7	/	2021.08.01	2022.08.02

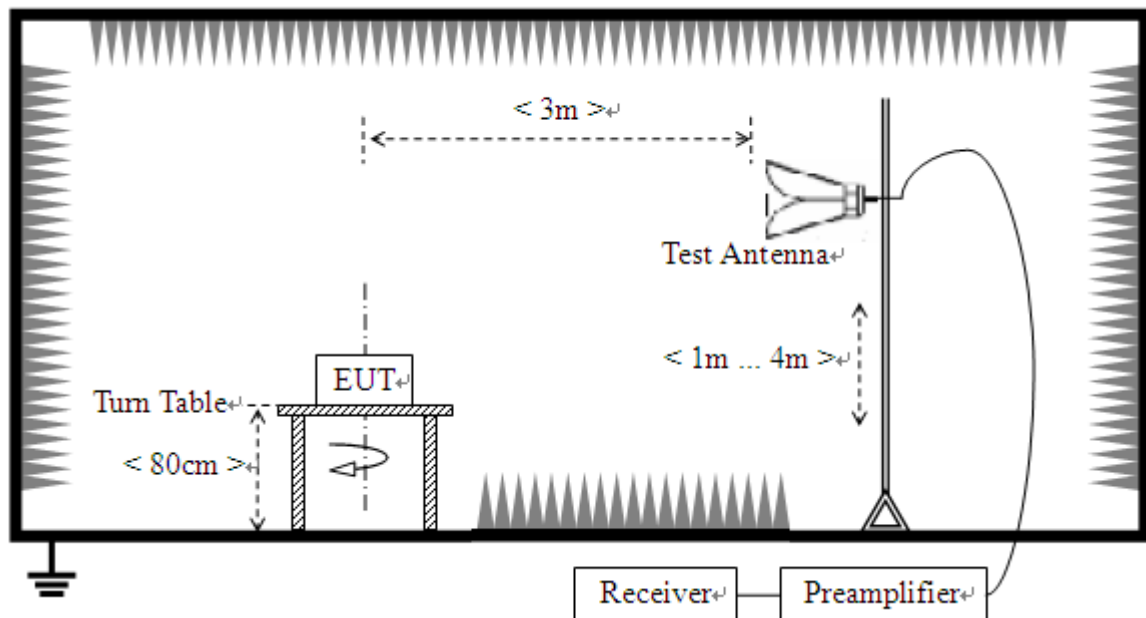
2.4.2 Radiated Emission

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
EMI Test Receiver	ROHDE&SCHWARZ	ESIB7	A0501375	2021.04.21	2022.04.20
EMI Test Receiver	ROHDE&SCHWARZ	ESIB7	A0501375	2022.04.18	2023.04.17
Broadband Ant.	2786	ETC	A150402240	2021.09.16	2024.03.03
3M Anechoic Chamber	Albatross	SAC-3MAC 9*6*6m	A0412375	2019.03.26	2023.03.25
EMI Test Receiver	ROHDE&SCHWARZ	ESW26	A180502935	2021.08.12	2022.08.01
System Simulator	ROHDE&SCHWARZ	CMW500	A150802214	2021.08.06	2022.08.02
5M Anechoic Chamber	Albatross	SAC-5MAC 12.8x6.8x6.4m	A0304210	2019.03.25	2023.03.24
EMI Horn Ant.	ETC	1209	A150402241	2022.04.17	2024.01.01



3. 47 CFR PART 15B REQUIREMENTS

3.1 Conducted Emission

3.1.1 Requirement

According to FCC section 15.107, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

Note:

- The limit subjects to the Class B digital device.
- The lower limit shall apply at the band edges.
- The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

3.1.2 Test Description

See section 2.4.1 of this report.

3.1.3 Test Result

The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. All test modes are considered, refer to recorded points and plots below.

Note:

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a Nominal 120V AC,50/60Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

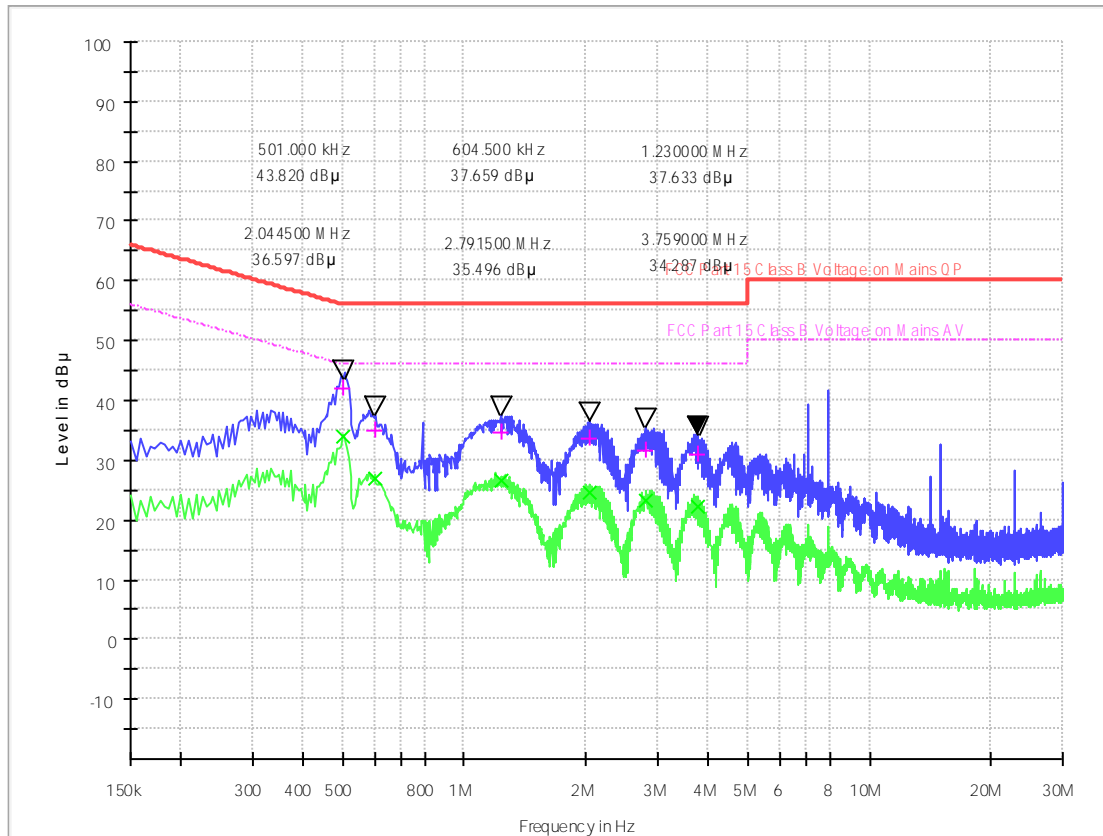
-Level(dB μ v)=Read Level(dB μ v)+Correction Factor(dB)

-Margin= Read Level(dB μ v)-Limit Line(dB μ v)

-Correction factor= LISN Factor(dB)+Cable Loss(dB)+ attenuation factor(dB)

Test voltage and frequency

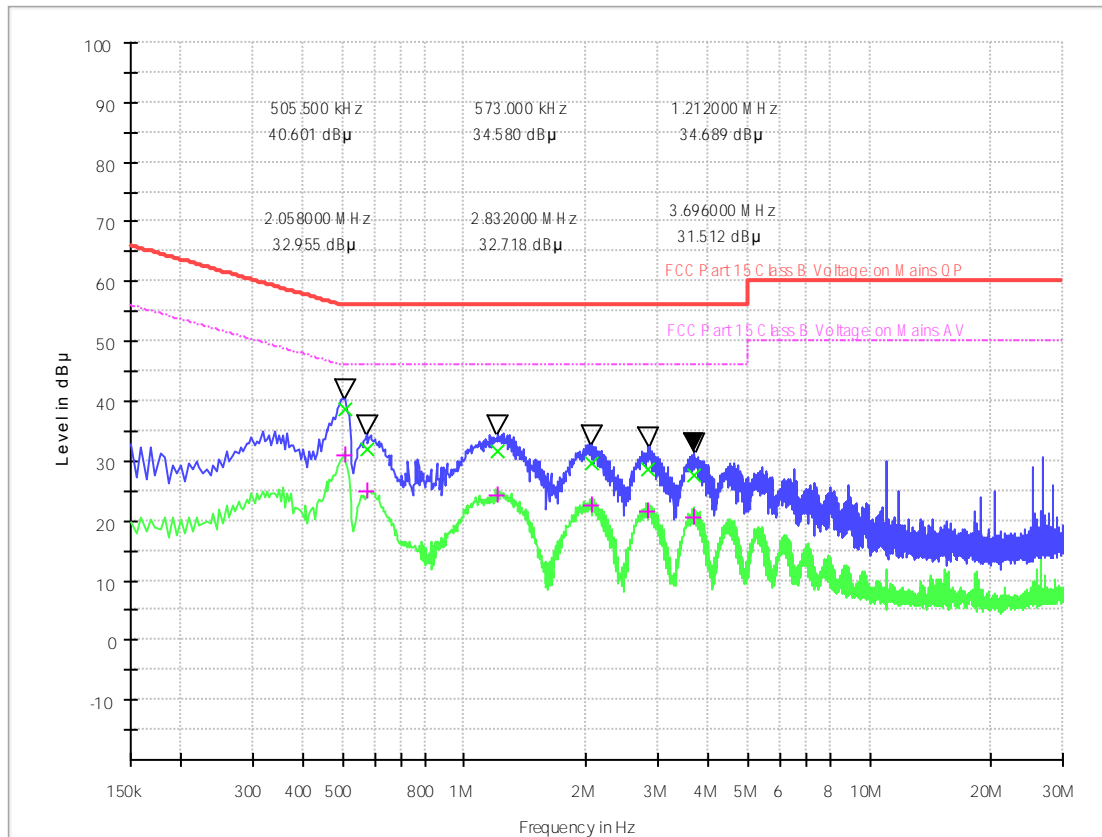
A. Mains terminal disturbance voltage, L phase



(Plot A: L Phase)

Frequency (MHz)	QuasiPeak (dB μ V)	CAverage (dB μ V)	Cabel Loss (dB)	Corr. (dB)	Margin - QPK	Limit - QPK	Margin - AV	Limit - AV (dB μ V)
0.501000	41.89	33.90	0.2	10.2	14.11	56.0	12.10	46.0
0.604500	34.86	26.96	0.2	10.2	21.14	56.0	19.04	46.0
1.230000	34.50	26.49	0.2	10.2	21.50	56.0	19.51	46.0
2.044500	33.47	24.72	0.2	10.2	22.53	56.0	21.28	46.0
2.791500	31.55	23.35	0.2	10.2	24.45	56.0	22.65	46.0
3.759000	31.00	22.30	0.2	10.2	25.00	56.0	23.70	46.0

B. Mains terminal disturbance voltage, N phase



(Plot B: N Phase)

Frequency (MHz)	QuasiPeak (dB µ V)	CAverage (dB µ V)	Cabel Loss (dB)	Corr. (dB)	Margin - QPK	Limit - QPK	Margin - AV	Limit - AV (dB µ V)
0.505500	38.50	30.89	0.2	10.2	17.50	56.0	15.11	46.0
0.573000	31.96	24.92	0.2	10.2	24.04	56.0	21.08	46.0
1.212000	31.50	24.27	0.2	10.2	24.50	56.0	21.73	46.0
2.058000	29.72	22.51	0.2	10.2	26.28	56.0	23.49	46.0
2.832000	28.46	21.49	0.2	10.2	27.54	56.0	24.51	46.0
3.696000	27.54	20.70	0.2	10.2	28.46	56.0	25.30	46.0



Radiated Emission

3.1.4 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	($\mu\text{V/m}$)	(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

- 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 dBuV/m is calculated by $20\log \text{Emission Level}(\mu\text{V/m})$.
- 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 30uV/m, then F.S Limitation at 3m distance is adjusted as

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

3.1.5 Test Description

See section 2.3.2 of this report.



3.1.6 Test Result

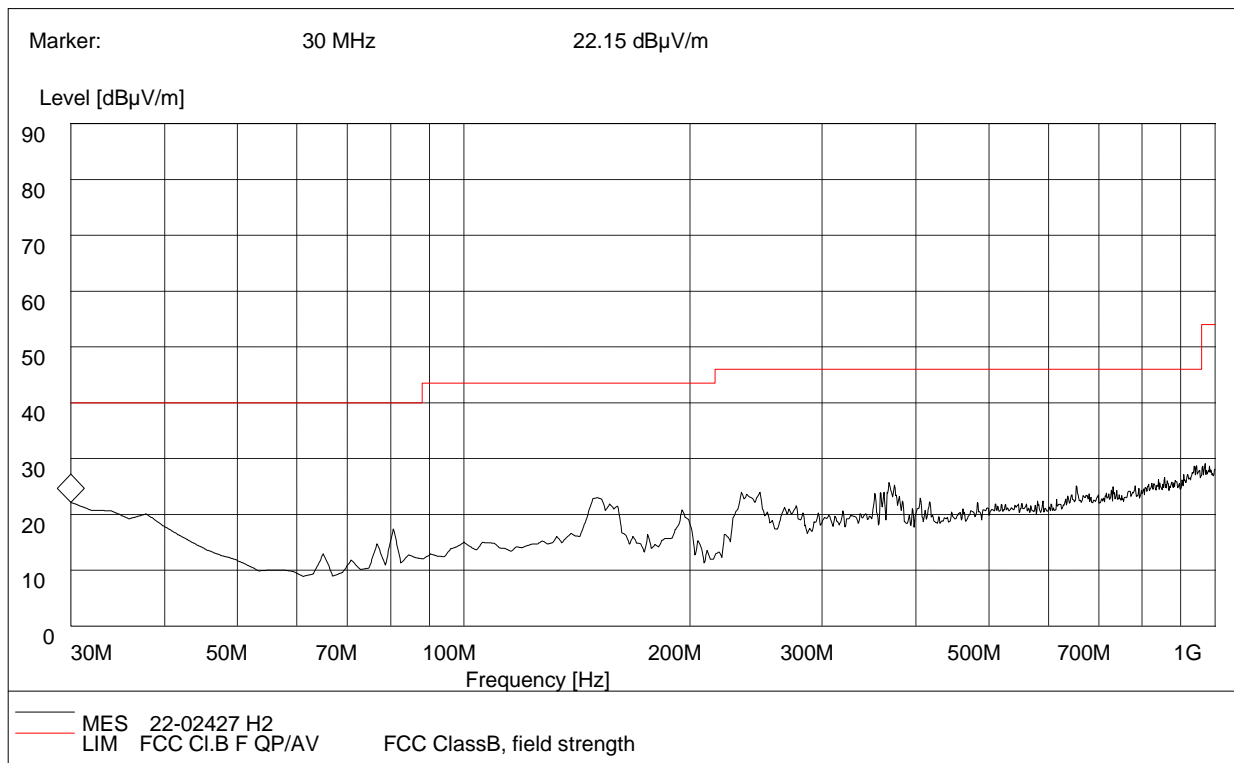
The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors. Both the vertical and the horizontal polarizations of the Test Antenna are considered to perform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

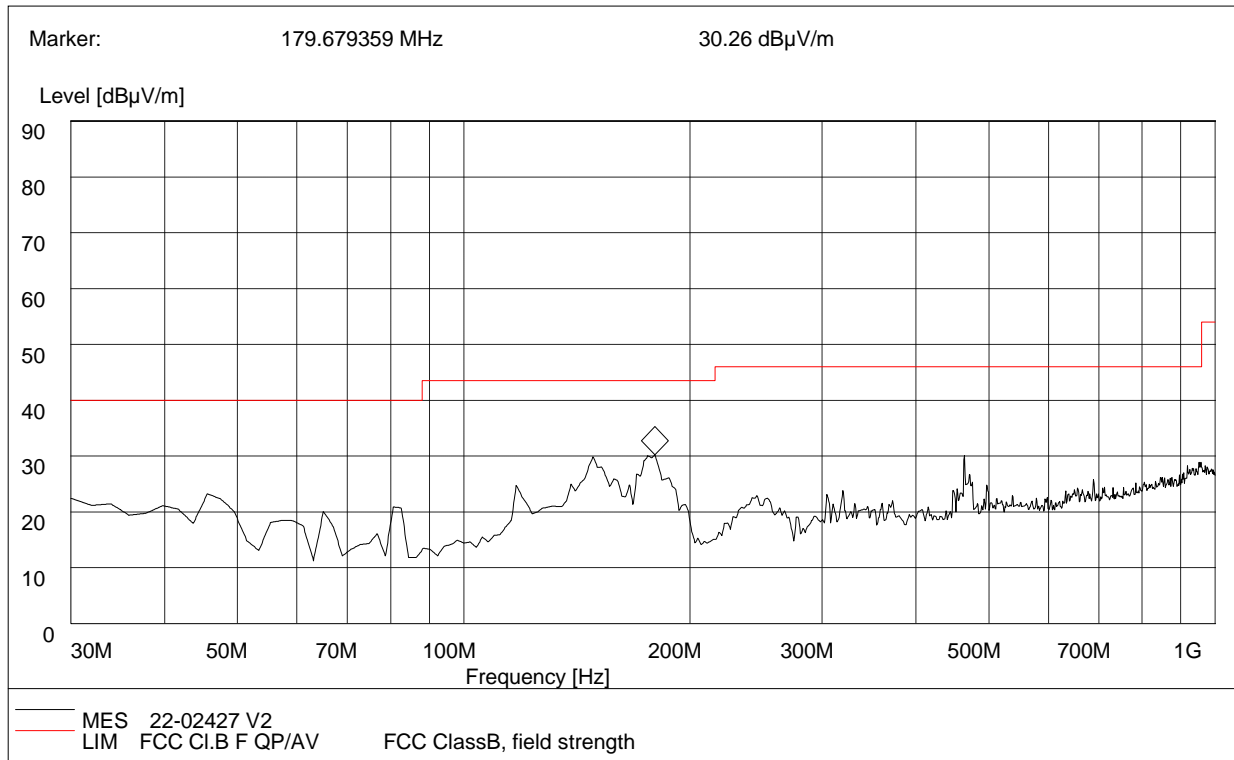
-Emission Level(dBuV/m)= 20log Emission Level(uV/m)

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

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

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

Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Margin (dB)	Antenna	Cable Loss(dB)	ANT. Factor(dB)	Verdict
30.00	22.05	120.000	127	40.0	17.95	Horizont	0.1	25.7	Pass
37.75	20.02	120.000	130	40.0	19.98	Horizont	0.3	25.4	Pass
150.05	22.72	120.000	151	43.5	20.78	Horizont	0.2	26.3	Pass
195.23	20.00	120.000	109	43.5	23.50	Horizont	0.1	26.2	Pass
247.26	23.23	120.000	115	46.0	22.77	Horizont	0.2	29.2	Pass
368.53	24.50	120.000	132	46.0	21.50	Horizont	0.2	29.0	Pass

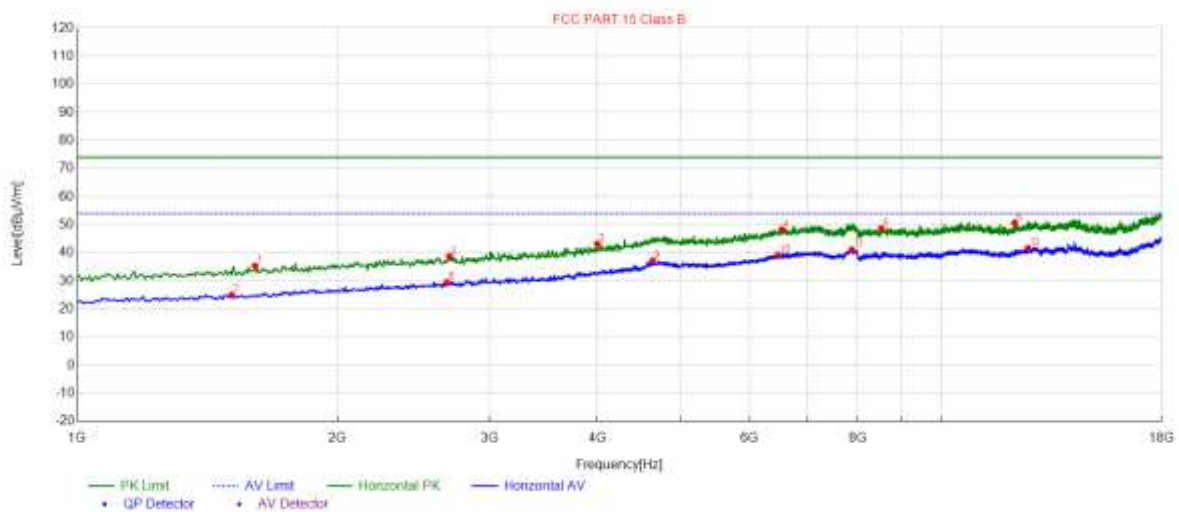
**B.Radiation disturbances, antenna polarization: Vertical**

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

Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Margin (dB)	Antenna	Cable Loss(dB)	ANT. Factor(dB)	Verdict
30.00	21.35	120.000	109	40.0	18.65	Vertical	0.1	25.8	Pass
45.53	22.21	120.000	117	40.0	17.79	Vertical	0.1	26.2	Pass
117.85	23.64	120.000	124	43.5	19.86	Vertical	0.2	26.3	Pass
179.83	29.55	120.000	130	43.5	13.95	Vertical	0.2	29.1	Pass
463.53	28.71	120.000	126	46.0	17.29	Vertical	0.3	29.2	Pass
688.54	25.35	120.000	134	46.0	20.65	Vertical	0.2	29.3	Pass

Test Result: PASS

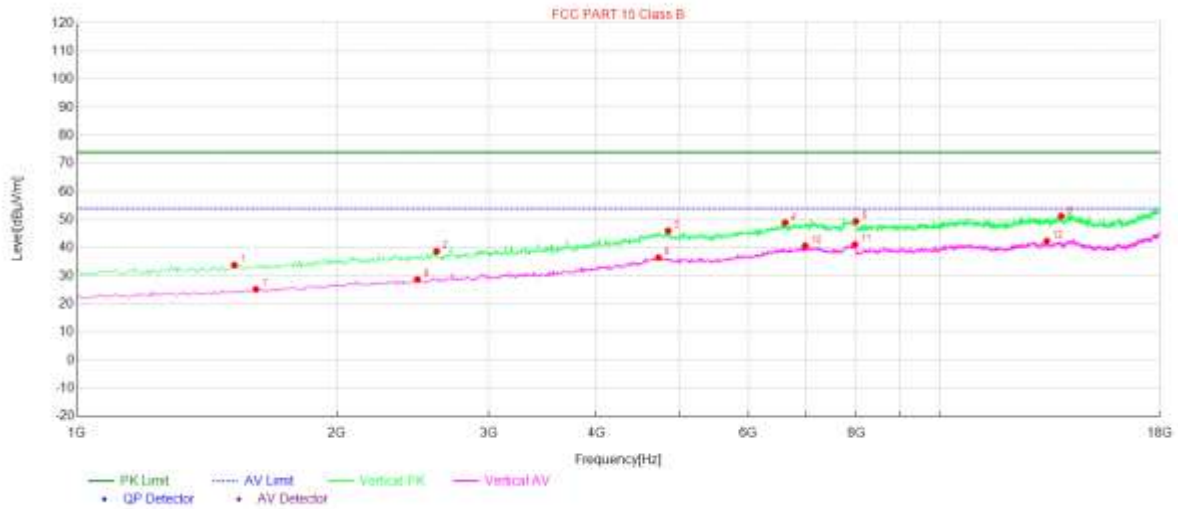
A.Radiation disturbances, antenna polarization: Horizontal



(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	1606.53	35.34	-13.58	74.00	38.66	PK	135	132	Horizontal
2	2694.89	38.73	-9.47	74.00	35.27	PK	144	143	Horizontal
3	3998.66	43.18	-4.84	74.00	30.82	PK	121	292	Horizontal
4	6538.17	48.32	2.52	74.00	25.68	PK	109	127	Horizontal
5	8522.17	48.63	4.50	74.00	25.37	PK	127	205	Horizontal
6	12155.7	50.65	6.52	74.00	23.35	PK	130	344	Horizontal
7	1510.17	24.96	-14.01	54.00	29.04	AV	158	251	Horizontal
8	2677.89	29.50	-9.55	54.00	24.50	AV	116	109	Horizontal
9	4633.54	37.21	-1.38	54.00	16.79	AV	138	302	Horizontal
10	6470.15	39.18	2.30	54.00	14.82	AV	129	219	Horizontal
11	7875.95	41.10	4.06	54.00	12.90	AV	141	154	Horizontal
12	12597.8	41.66	7.34	54.00	12.34	AV	134	183	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	1702.90	35.29	-13.24	74.00	38.71	PK	133	109	Vertical
2	3358.11	40.35	-7.53	74.00	33.65	PK	124	302	Vertical
3	5177.72	45.30	-1.39	74.00	28.70	PK	151	134	Vertical
4	7898.63	49.78	4.10	74.00	24.22	PK	147	117	Vertical
5	10285.0	50.38	5.67	74.00	23.62	PK	125	325	Vertical
6	12898.2	50.82	8.05	74.00	23.18	PK	136	214	Vertical
7	1702.90	26.23	-13.24	54.00	27.77	AV	119	38	Vertical
8	2972.65	30.69	-8.67	54.00	23.31	AV	124	217	Vertical
9	5982.66	37.89	0.21	54.00	16.11	AV	108	206	Vertical
10	7824.94	41.65	3.99	54.00	12.35	AV	133	302	Vertical
11	10885.9	41.31	6.57	54.00	12.69	AV	113	174	Vertical
12	14026.3	42.73	9.41	54.00	11.27	AV	148	181	Vertical

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