EMC TEST REPORT

Report No.:	SET2022-13112
Product Name:	Pulse Oximeter
FCC ID:	2ABOGCMS50F
Model No. :	CMS50F
Applicant:	Contec Medical Systems Co., Ltd.
Address:	No.112 Qinhuang West Street, Economic &Technical Development Zone, Qinhuangdao, Hebei Province, PEOPLE`S REPUBLIC OF CHINA
Received Date:	2022.09.16
Dates of Testing:	2022.09.16—2022.09.26
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

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Test Report

Product Name.....	Pulse Oximeter
Model No.	CMS50F
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 2022.09.26

Reviewed by ..... Chris You

Chris You Senior Engineer 2022.09.26

Approved by ..... Shuangwen Zhang

2022.09.26

Shuangwen Zhang, Manager

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Change History		
Issue	Date	Reason for change
1.0	2022.09.26	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
Power supply……..:	Battery Battery Voltage: DC 3.6V-4.2V Operating Current:≤100mA

Note1:The EUT is a Pulse Oximeter;
Note2 :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 2018	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.

Facilities and Accreditations

1.2.1 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.

1.2.2 Test Environment Conditions

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

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

1.2.3 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
Adapter	ZTE	STC-A515A-A	N/A	N/A

Support Cable：

Description	Shield Type	Ferrite Core	Length
PC Power adapter Cable	Un- shielding	No	1.2m
Mouse Cable	Un- shielding	No	1m
Network Cable	Un- shielding	No	1.2m

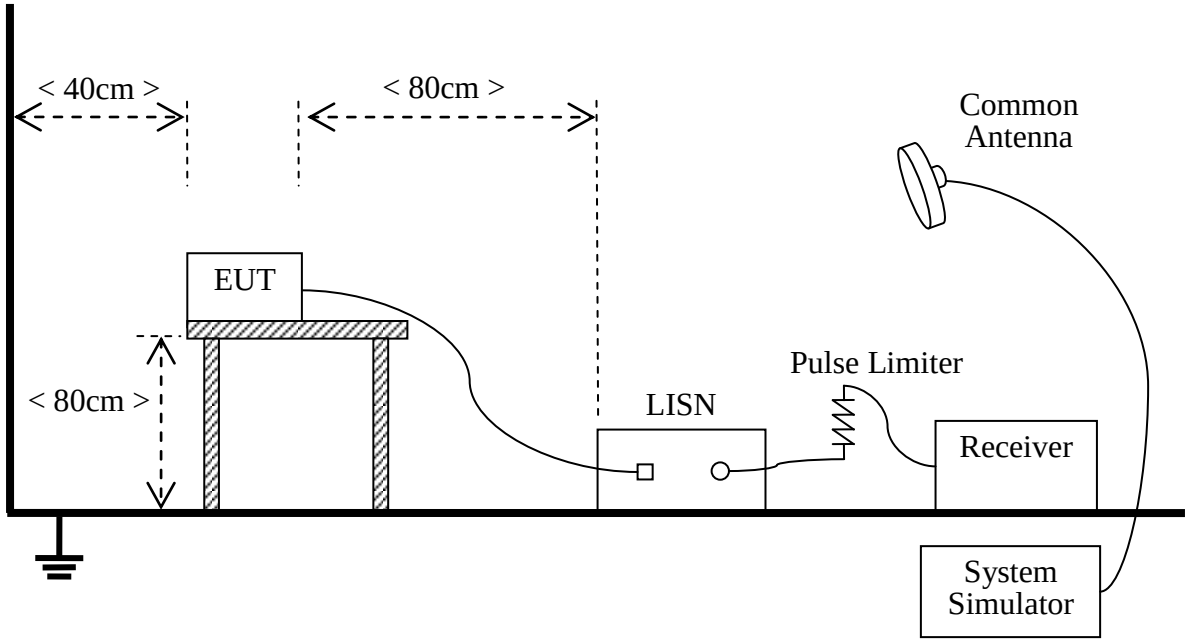
2.2 Test Mode

The EUT have the following typical setups during the test:
Setup1: EUT+ Charger;
Setup2: EUT Working+ Battery;

2.3 Test Setup and Equipment List

2.3.1 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 50Ω/50μH 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.

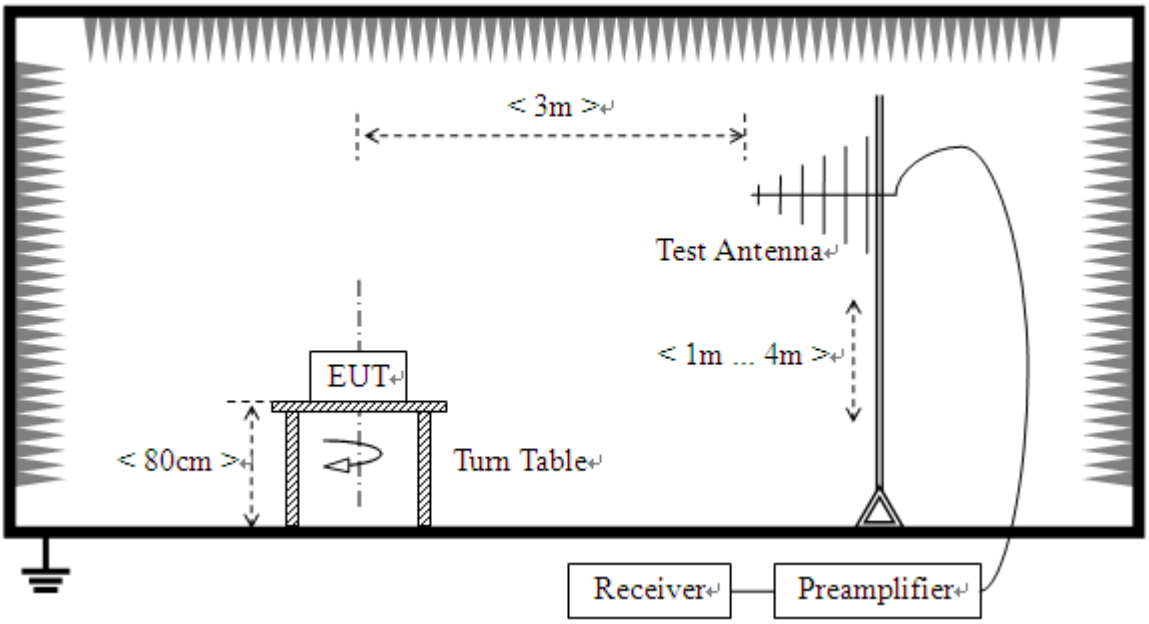
B. Equipments List:

Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due. Date
Test Receiver	KEYSIGHT	N9038A	A141202036	2022.07.21	2023.07.20
LISN	ROHDE&SCHWARZ	ENV216	A140701847	2022.07.21	2023.07.20
Cable	MATCHING PAD	W7	/	2022.08.02	2023.08.02

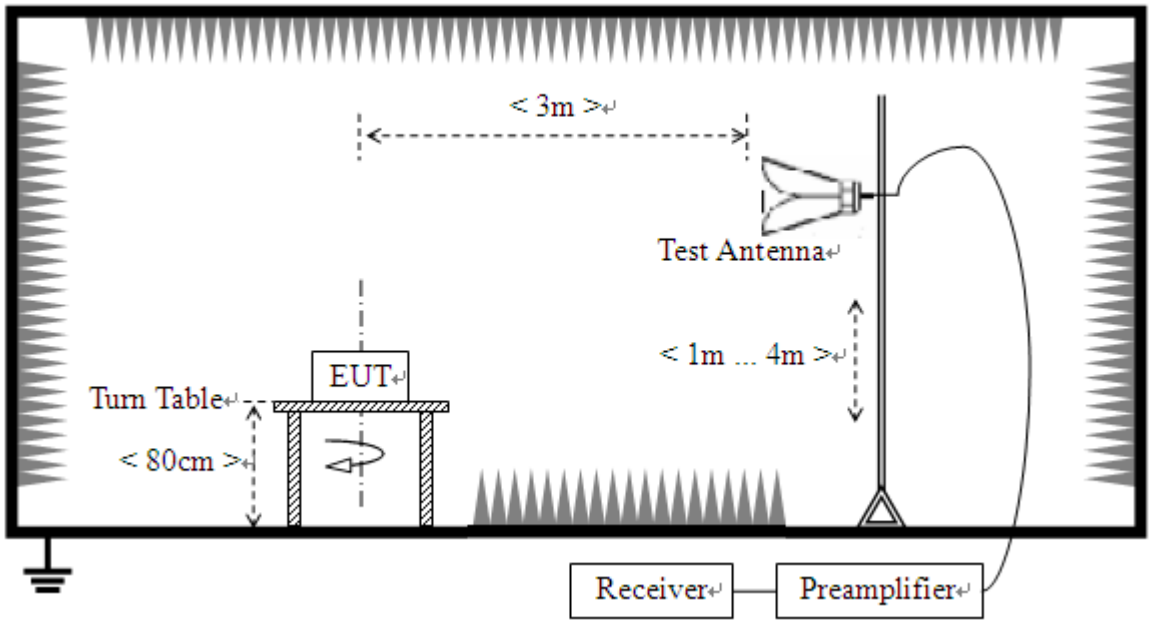
2.3.2 Radiated Emission

A. Test Setup:

1) For radiated emissions from 30MHz to1GHz



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	ESCI	A0902601	2022.05.23	2023.04.17
Broadband Ant.	2786	ETC	A150402239	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	2022.07.21	2023.07.20
5M Anechoic Chamber	Albatross	SAC-5MAC 12.8x6.8x6.4m	A0304210	2022.03.25	2023.03.24
EMI Horn Ant.	ROHDE&SCHWARZ	HF906	A0304225	2019.03.25	2023.03.24

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 50μH/50Ω line impedance stabilization network (LISN).

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

Note:

a) The limit subjects to the Class B digital device.

b) The lower limit shall apply at the band edges.

c) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

3.1.2 Test Description

See section 2.3.1 of this report.

3.1.3 Test Result

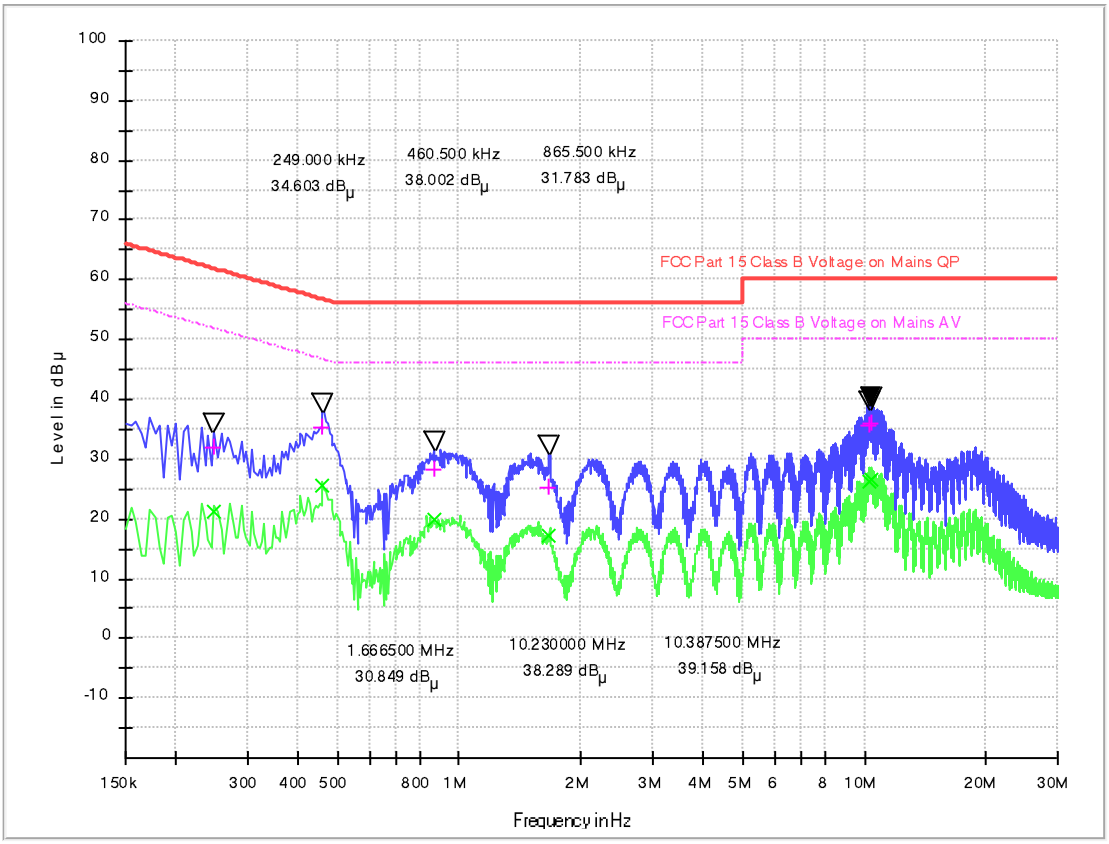
The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines 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.

Test voltage and frequency (120V AC,60Hz)

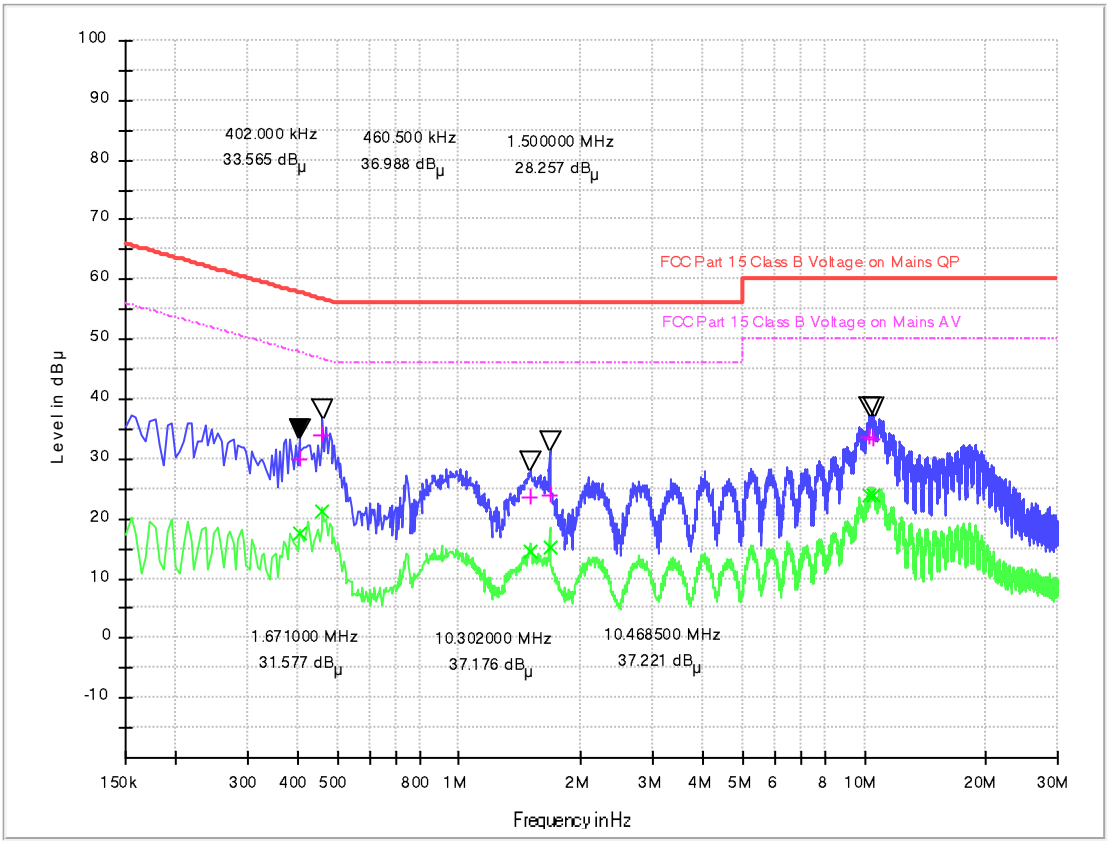
A. Mains terminal disturbance voltage, L phase, Setup 1



(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)
0.249000	32.06	21.16	0.1	10.3	29.73	61.8	30.63	51.8
0.460500	35.39	25.69	0.1	10.2	21.29	56.7	20.99	46.7
0.865500	28.31	19.90	0.1	10.2	27.69	56.0	26.10	46.0
1.666500	25.27	17.27	0.1	10.2	30.73	56.0	28.73	46.0
10.23000	35.54	26.19	0.3	10.6	24.46	60.0	23.81	50.0
10.38750	36.01	26.54	0.3	10.6	23.99	60.0	23.46	50.0

B. Mains terminal disturbance voltage, N phase, Setup 1



(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)
0.402000	30.07	17.67	0.1	10.2	27.74	57.8	30.14	47.8
0.460500	33.81	21.08	0.1	10.2	22.87	56.7	25.60	46.7
1.500000	23.59	14.49	0.1	10.2	32.41	56.0	31.51	46.0
1.671000	23.87	15.27	0.1	10.2	32.13	56.0	30.73	46.0
10.30200	33.61	24.05	0.2	10.6	26.39	60.0	25.95	50.0
10.46850	33.27	24.04	0.2	10.6	26.73	60.0	25.96	50.0

3.2 Radiated Emission

3.2.1 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) 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.

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 20log 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 = 30uV/m * $(10)^2$ = 100 * 30uV/m.

3.2.2 Test Description

See section 2.3.2 of this report.

3.2.3 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.

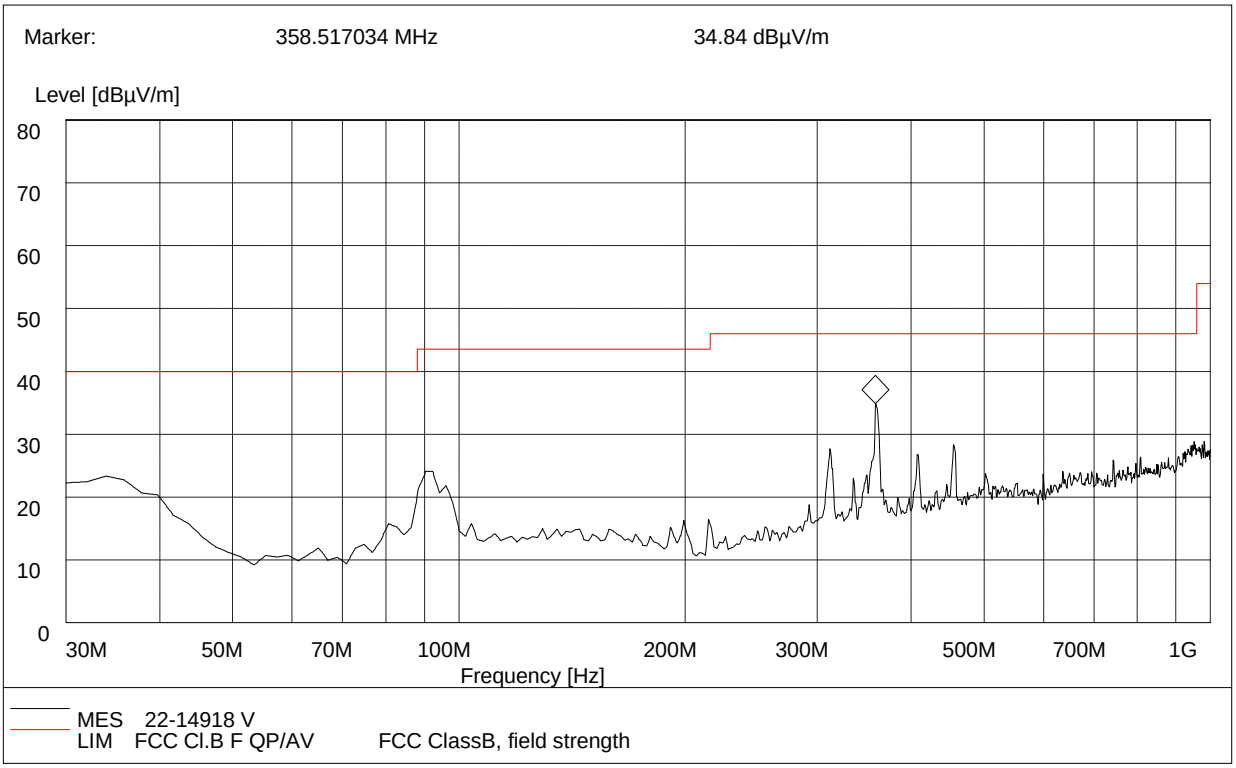
The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

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.

Emissions above 18GHz are attenuated 20dB below the limit, so it does not record

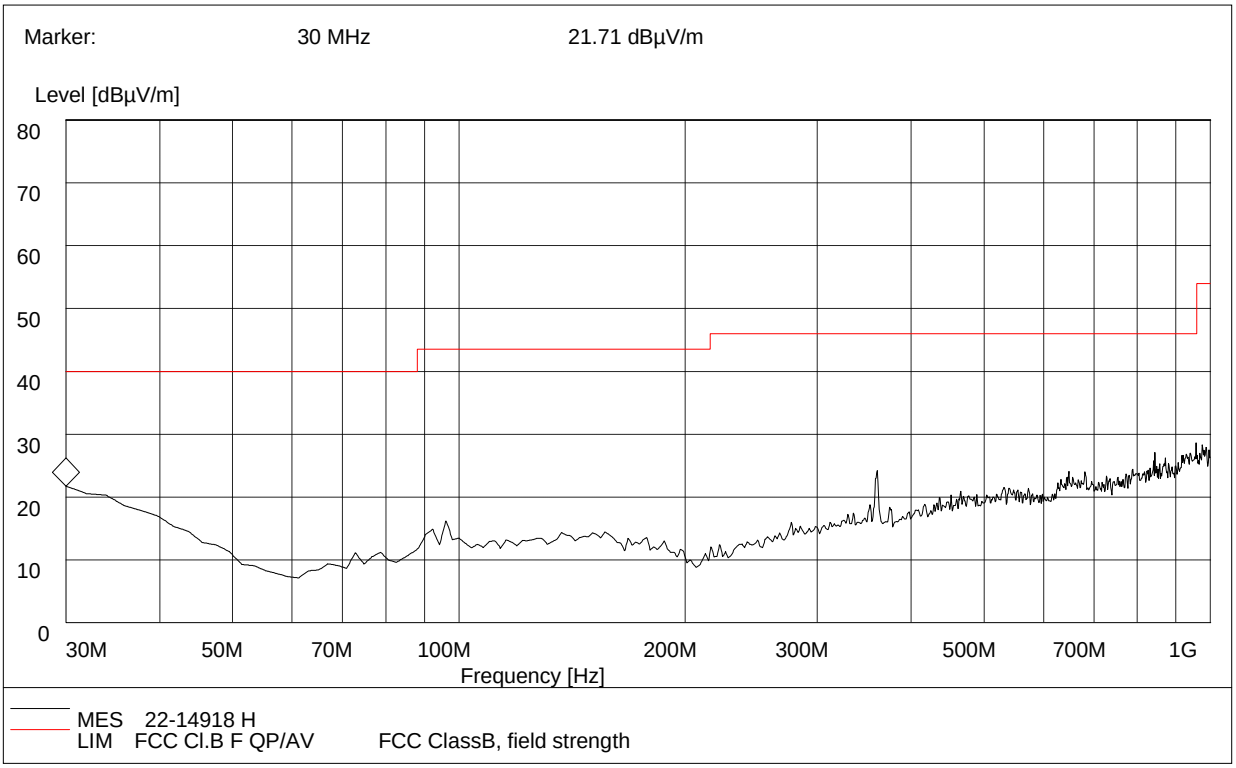
A.Radiation disturbances, antenna polarization:Vertical,Setup1



(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
32.47	23.61	120.000	125	40.00	16.39	Vertical	0.1	26.1	Pass
80.09	15.53	120.000	104	40.00	24.47	Vertical	0.2	26.2	Pass
92.38	23.44	120.000	116	43.50	20.06	Vertical	0.2	26.4	Pass
200.18	16.29	120.000	133	43.50	27.21	Vertical	0.5	26.5	Pass
311.23	26.37	120.000	110	46.00	19.63	Vertical	0.5	26.8	Pass
358.37	34.24	120.000	131	46.00	11.76	Vertical	0.7	27.0	Pass

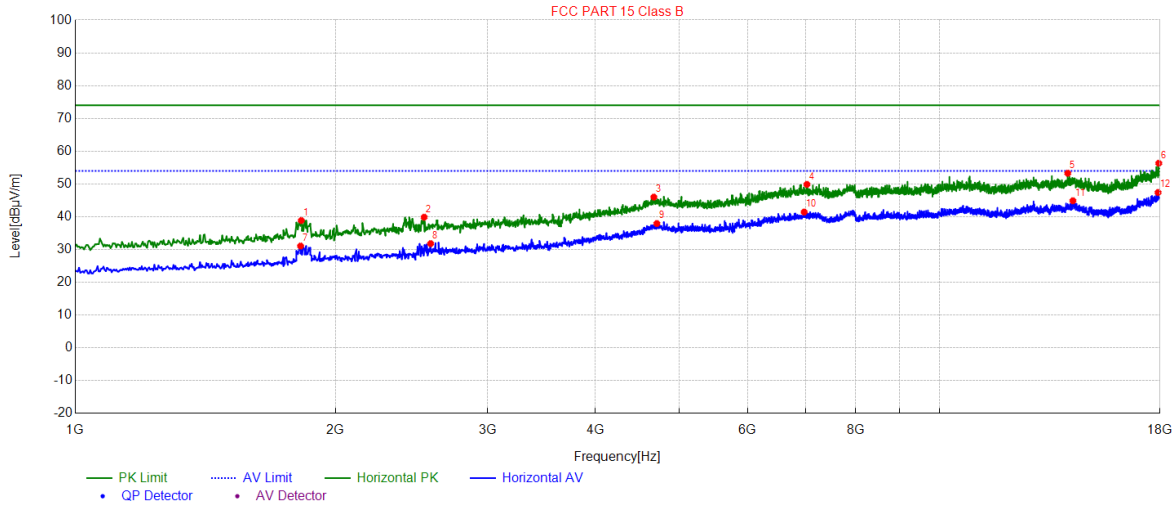
B.Radiation disturbances, antenna polarization: Horizontal



(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	21.65	120.000	129	40.00	18.35	Horizontal	0.1	26.1	Pass
78.63	11.00	120.000	117	40.00	29.00	Horizontal	0.2	26.2	Pass
96.43	16.20	120.000	124	43.50	27.30	Horizontal	0.2	26.4	Pass
156.77	13.53	120.000	109	43.50	29.97	Horizontal	0.3	26.5	Pass
360.36	23.64	120.000	133	46.00	22.36	Horizontal	0.3	27.4	Pass
844.15	27.39	120.000	121	46.00	18.61	Horizontal	0.7	28.4	Pass

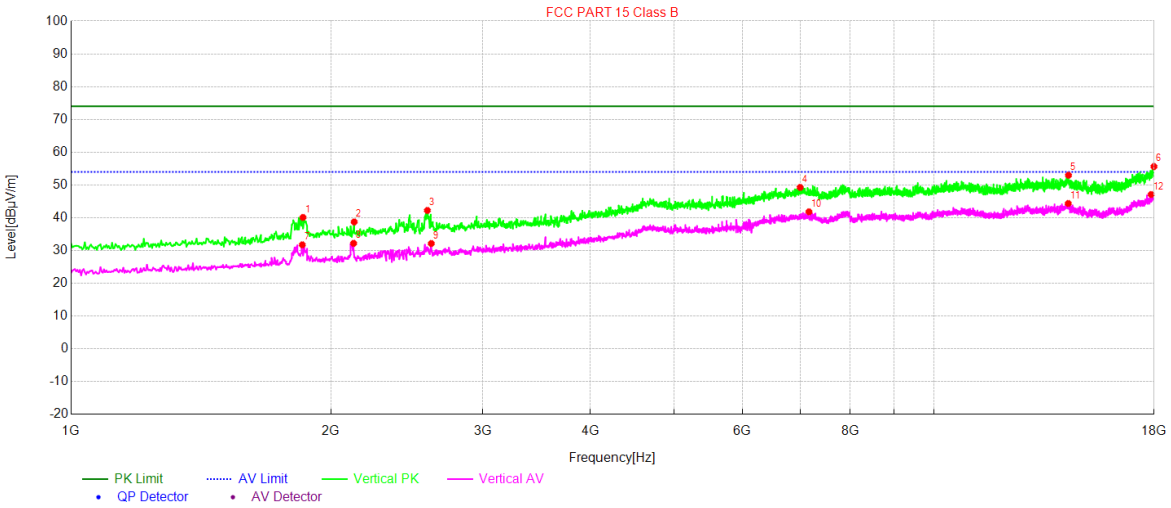
A.Radiation disturbances, antenna polarization: Horizontal



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

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin[dB µV/m]	Trace	Height [cm]	Angle [°]	Polarity
1	1826.36	38.86	-12.62	74.00	35.14	PK	131	59	Horizontal
2	2533.70	39.86	-10.15	74.00	34.14	PK	109	213	Horizontal
3	4672.73	46.00	-1.21	74.00	28.00	PK	114	325	Horizontal
4	7026.00	49.87	3.36	74.00	24.13	PK	133	170	Horizontal
5	14079.0	53.28	9.33	74.00	20.72	PK	121	321	Horizontal
6	17942.1	56.33	14.74	74.00	17.67	PK	107	29	Horizontal
7	1822.96	31.07	-12.64	54.00	22.93	AV	124	114	Horizontal
8	2577.91	31.81	-10.02	54.00	22.19	AV	119	127	Horizontal
9	4710.14	37.93	-1.06	54.00	16.07	AV	108	263	Horizontal
10	6974.99	41.44	3.30	54.00	12.56	AV	131	209	Horizontal
11	14272.8	44.88	9.77	54.00	9.12	AV	114	191	Horizontal
12	17908.1	47.40	14.68	54.00	6.60	AV	126	114	Horizontal

B.Radiation disturbances, antenna polarization: Vertical



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

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin[dBµV/m]	Trace	Height [cm]	Angle [°]	Polarity
1	1856.97	40.10	-12.48	74.00	33.90	PK	134	261	Vertical
2	2129.02	38.73	-11.53	74.00	35.27	PK	125	147	Vertical
3	2588.11	42.24	-9.99	74.00	31.76	PK	127	49	Vertical
4	6998.79	49.25	3.34	74.00	24.75	PK	116	300	Vertical
5	14323.8	52.96	9.72	74.00	21.04	PK	111	224	Vertical
6	17993.1	55.63	14.85	74.00	18.37	PK	129	295	Vertical
7	1853.57	31.75	-12.50	54.00	22.25	AV	150	218	Vertical
8	2125.62	32.20	-11.54	54.00	21.80	AV	103	254	Vertical
9	2615.32	32.15	-9.88	54.00	21.85	AV	127	223	Vertical
10	7165.43	41.81	3.46	54.00	12.19	AV	144	304	Vertical
11	14313.6	44.36	9.79	54.00	9.64	AV	130	291	Vertical
12	17857.1	47.09	14.17	54.00	6.91	AV	121	25	Vertical

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