



EMC TEST REPORT

Report No.: 20230517G05486X -W1

Product Name: InfiRay Laser Rangefinder

FCC ID: 2AYGT-41-ILR

Model No. : ILR-1200-3

Applicant: IRay Technology Co., Ltd.

Address: 11GUIYANG STREET, YANTAI ECONOMY AND TECHNOLOGY DEVELOPMENT DISTRICT, YANTAI SHANDONG P.R.CHINA.

Received Date: 2023.05.31

Dates of Testing: 2023.06.15-2023.06.26

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

This test report consists of **16** 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..... InfiRay Laser Rangefinder

Model No. ILR-1200-3

Trade name..... InfiRay

Brand Name..... InfiRay

Applicant..... IRay Technology Co.,Ltd.

Applicant Address..... 11GUIYANG STREET, YANTAI ECONOMY AND TECHNOLOGY DEVELOPMENT DISTRICT, YANTAI SHANDONG P.R.CHINA.

Manufacturer IRay Technology Co.,Ltd.

Manufacturer Address 11GUIYANG STREET, YANTAI ECONOMY AND TECHNOLOGY DEVELOPMENT DISTRICT, YANTAI SHANDONG P.R.CHINA.

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

Test Result..... PASS

Tested by Ruihong Xie

Ruihong Xie Test Engineer 2023.06.27

Reviewed by Chris You

Chris You Senior Engineer 2023.06.27

Approved by Yang Fan

Yang Fan, Manager 2023.06.27



TABLE OF CONTENTS

- 1. GENERAL INFORMATION4**
- 1.1 EUT Description4**
- Facilities and Accreditations6**
- 1.1.1 Facilities6
- 1.1.2 Test Environment Conditions.....6
- 1.1.3 Measurement Uncertainty6
- 2. TEST CONDITIONS SETTING7**
- 2.1 Test Peripherals7**
- 2.2 Test Mode7**
- 2.3 Test Setup and Equipments List.....8**
- 2.3.1 Radiated Emission.....8
- 3. 47 CFR PART 15B REQUIREMENTS10**
- 3.1 Conducted Emission10**
- 3.1.1 Requirement 10
- 3.1.2 Test Result 10
- 3.2 Radiated Emission 11**
- 3.2.1 Requirement 11
- 3.2.2 Test Description 12
- 3.2.3 Test Result 12

Change History		
Issue	Date	Reason for change
1.0	2023.06.27	First edition



1. GENERAL INFORMATION

1.1 EUT Description

EUT Name : InfiRay Laser Rangefinder
Trade Name.....: InfiRay
Brand Name.....: InfiRay
Hardware Version..... : N/A
Software Version : N/A

*Note1:*The EUT is a InfiRay Laser Rangefinder;

*Note2 :*For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



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.



Facilities and Accreditations

1.1.1 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 June 30, 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 30, 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.

1.1.2 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

1.1.3 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
MATE	InfiRay	MATE MAL38	/	/

Support Cable:

Description	Shield Type	Ferrite Core	Length
/	/	/	/

2.2 Test Mode

The EUT have the following typical setups during the test:

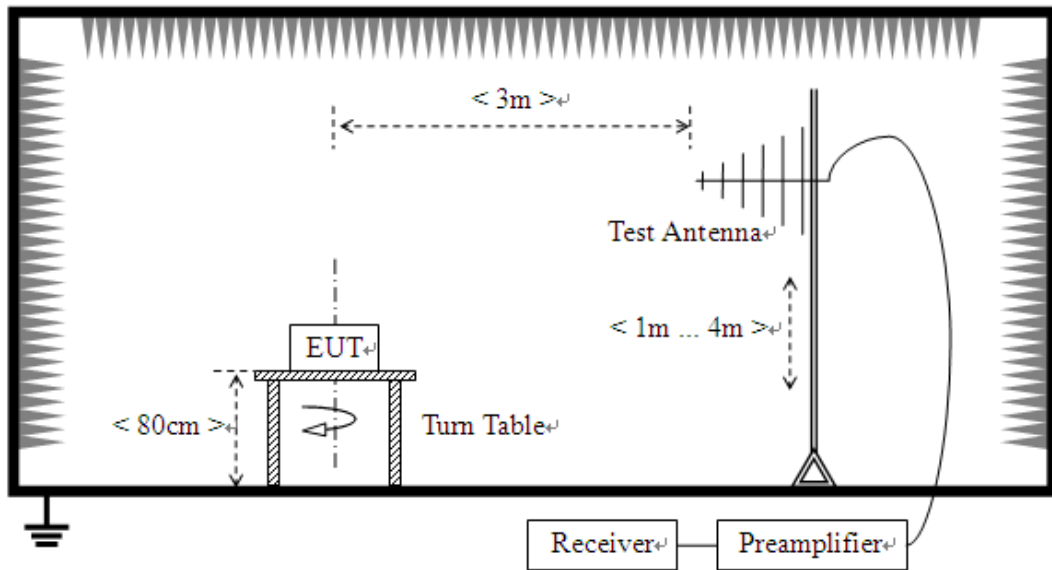
Setup1: Battery +EUT+Mate;

2.3 Test Setup and Equipments List

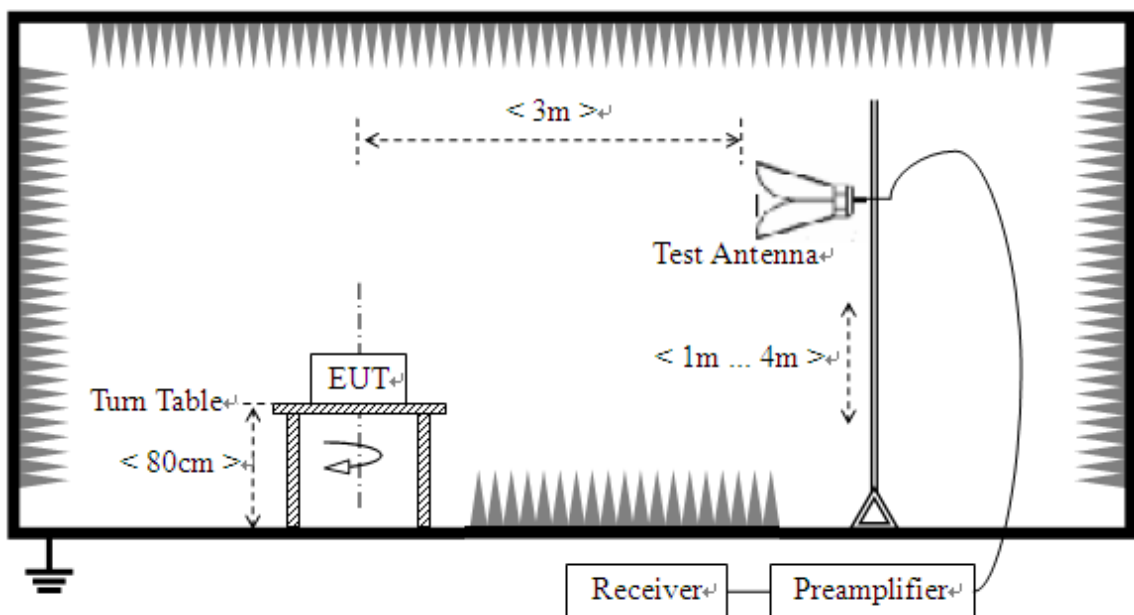
2.3.1 Radiated Emission

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
EMI Test Receiver	ROHDE&SCHWARZ	ESIB7	A0501375	2023.03.16	2024.03.15
Broadband Ant.	2786	ETC	A150402239	2021.09.16	2024.03.03
3M Anechoic Chamber	Albatross	SAC-3MAC 9*6*6m	A0412375	2019.03.26	2024.03.25
EMI Test Receiver	ROHDE&SCHWARZ	ESW26	A180502935	2022.07.21	2023.07.20
5M Anechoic Chamber	Albatross	SAC-5MAC 12.8x6.8x6.4m	A0304210	2022.06.08	2024.06.07
EMI Horn Ant.	ROHDE&SCHWARZ	HF906	A0304225	2022.04.11	2025.04.12



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 Result

Not applicable for this DC Power supply device



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	
	$\mu\text{V/m}$	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

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

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



3.2.2 Test Description

See section 2.3.2 of this report.

3.2.3 Test Result

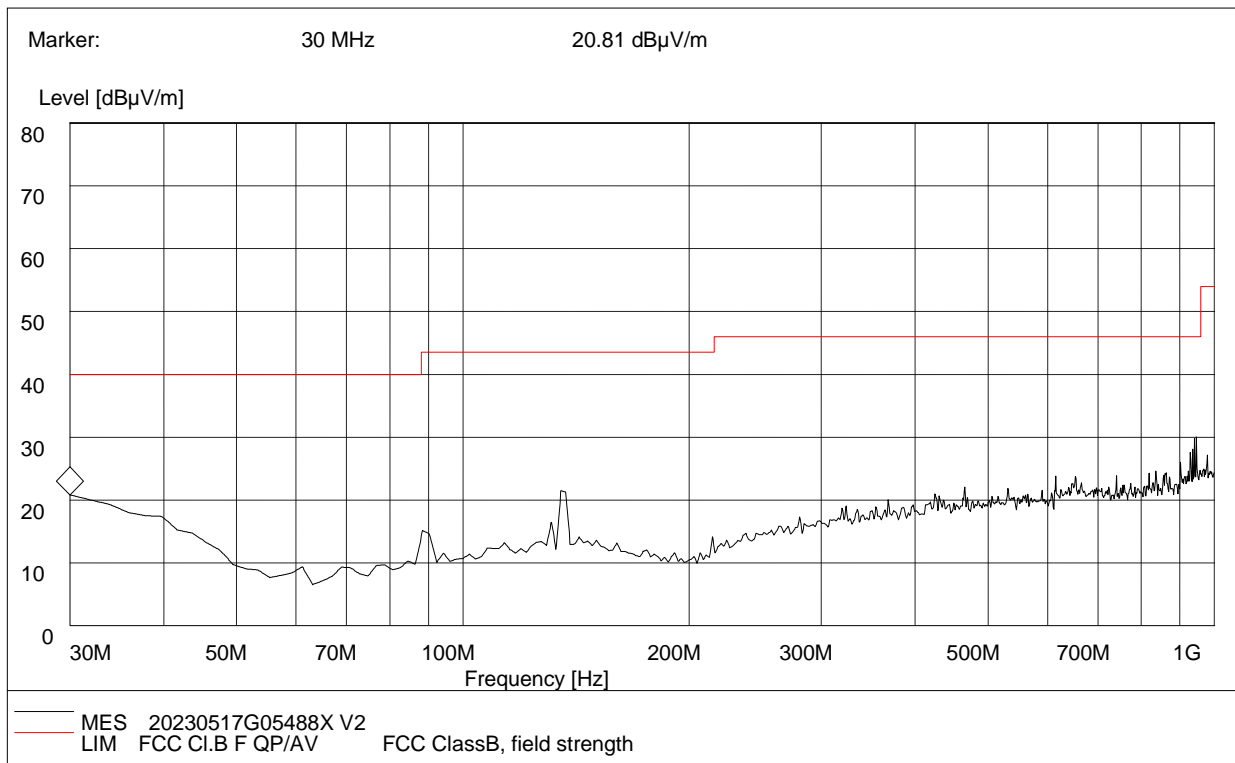
The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors. Both the vertical and the horizontal polarizations of the Test Antenna are considered to perform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



A.Radiation disturbances, antenna polarization: Vertical, Setup1, 3VDC

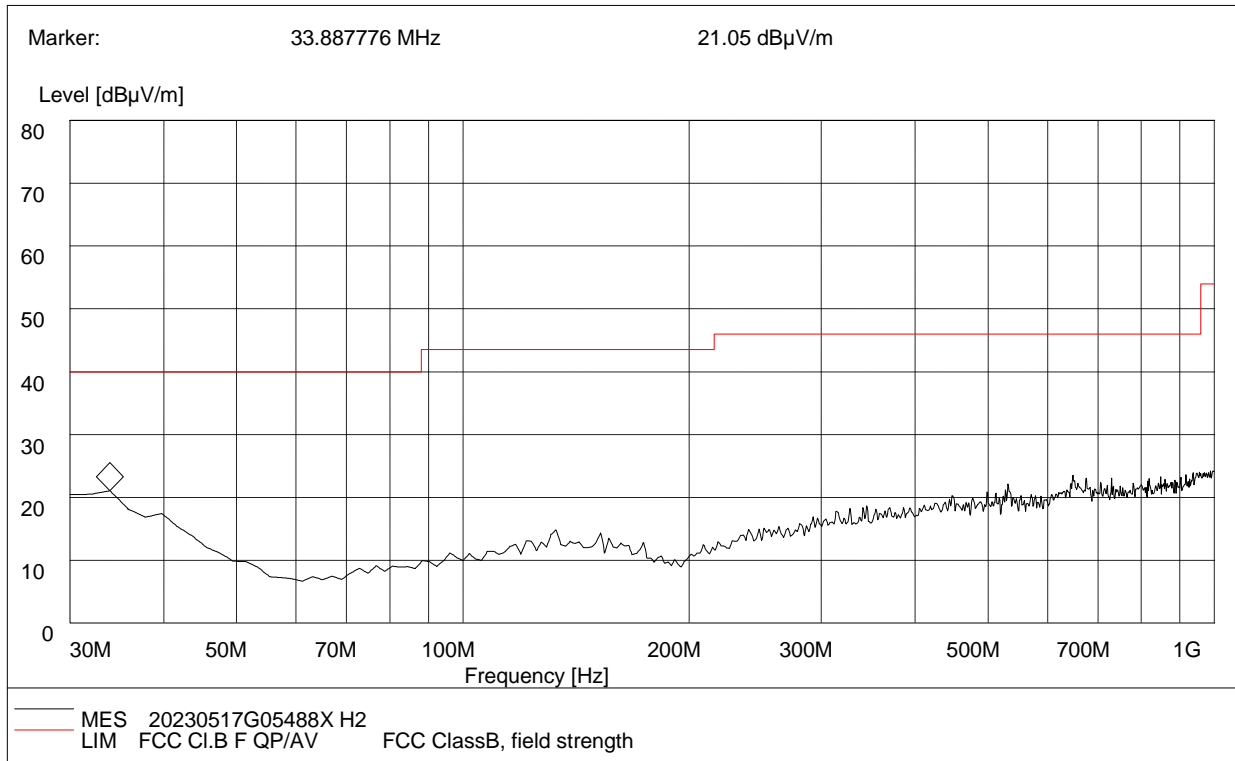


(Plot C: Test Antenna Vertical 30M - 1G)

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Margin (dB)	Antenna	Cable Loss(dB)	ANT. Factor(dB)	Verdict
30.62	19.81	120.000	108	40.0	20.19	Vertical	0.5	18.8	Pass
39.71	17.39	120.000	106	40.0	22.61	Vertical	0.5	13.5	Pass
131.08	16.39	120.000	106	43.5	27.11	Vertical	1.0	11.7	Pass
134.96	20.46	120.000	100	43.5	23.04	Vertical	1.0	11.6	Pass
465.43	21.05	120.000	103	46.0	24.95	Vertical	1.5	17.7	Pass
741.46	22.89	120.000	104	46.0	23.11	Vertical	1.8	20.2	Pass



B.Radiation disturbances, antenna polarization: Horizontal, Setup1,3VDC

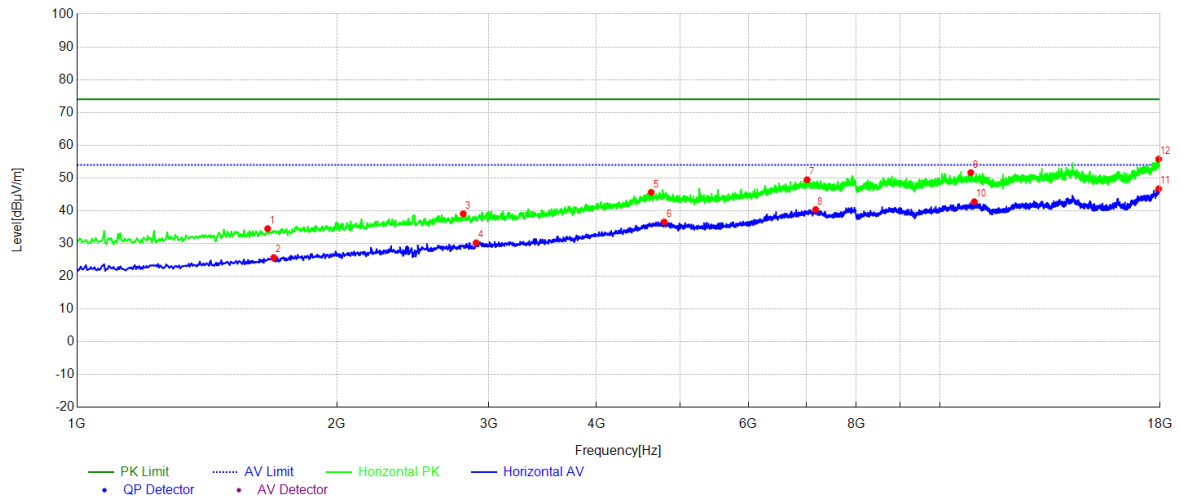


(Plot D: Test Antenna Horizontal 30M - 1G)

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Margin (dB)	Antenna	Cable Loss(dB)	ANT. Factor(dB)	Verdict
33.88	20.05	120.000	101	40.00	19.95	Vertical	0.5	19.2	Pass
39.73	17.44	120.000	101	40.00	22.56	Vertical	0.5	13.7	Pass
133.02	14.84	120.000	107	43.50	28.66	Vertical	1.0	11.6	Pass
152.46	14.32	120.000	105	43.50	29.18	Vertical	1.0	11.3	Pass
531.52	21.16	120.000	100	46.00	24.84	Vertical	1.5	18.4	Pass
648.15	22.56	120.000	102	46.00	23.44	Vertical	1.6	20.0	Pass



A.Radiation disturbances, antenna polarization: Horizontal,3VDC

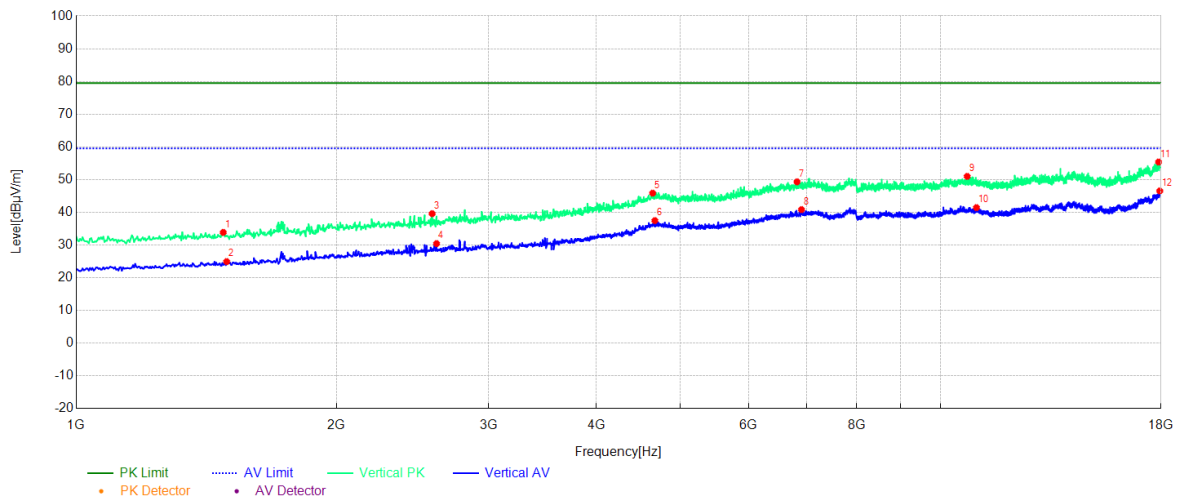


(Plot M: Test Antenna Horizontal 1G – 18G)

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin[dB µV/m]	Trace	Height [cm]	Angle [°]	Polarity
1	1663.13	34.54	-13.39	74.00	39.46	PK	104	342	Horizontal
2	1690.34	25.71	-13.29	54.00	28.29	AV	100	139	Horizontal
3	2802.36	39.07	-9.42	74.00	34.93	PK	100	140	Horizontal
4	2900.98	30.21	-8.83	54.00	23.79	AV	105	193	Horizontal
5	4628.53	45.62	-1.39	74.00	28.38	PK	107	25	Horizontal
6	4791.76	36.59	-0.85	54.00	17.41	AV	104	142	Horizontal
7	7015.80	49.46	3.36	74.00	24.54	PK	106	93	Horizontal
8	7179.04	40.36	3.47	54.00	13.64	AV	106	182	Horizontal
9	10861.97	51.62	6.54	74.00	22.38	PK	105	186	Horizontal
10	10963.99	42.75	6.64	54.00	11.25	AV	103	320	Horizontal
11	17931.99	46.69	14.72	54.00	7.31	AV	100	345	Horizontal
12	17931.99	55.75	14.72	74.00	18.25	PK	105	340	Horizontal



B.Radiation disturbances, antenna polarization: Vertical,Setup1,3VDC



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

NO	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin[dB µV/m]	Trace	Height [cm]	Angle [°]	Polarity
1	1513.50	33.90	-14.00	74.00	40.10	PK	104	80	Vertical
2	1540.71	25.10	-13.87	54.00	28.90	AV	103	283	Vertical
3	2713.94	39.42	-9.44	74.00	34.58	PK	112	262	Vertical
4	2775.16	30.22	-9.43	54.00	23.78	AV	108	132	Vertical
5	4601.32	45.69	-1.52	74.00	28.31	PK	107	310	Vertical
6	4716.94	36.68	-1.05	54.00	17.32	AV	106	85	Vertical
7	6998.80	40.65	3.34	54.00	13.35	AV	105	10	Vertical
8	7240.25	49.99	3.45	74.00	24.01	PK	102	355	Vertical
9	10787.16	51.51	6.44	74.00	22.49	PK	104	106	Vertical
10	10984.40	42.53	6.65	54.00	11.47	AV	108	291	Vertical
11	17979.60	46.67	14.82	54.00	7.33	AV	100	213	Vertical
12	17996.60	55.92	14.85	74.00	18.08	PK	103	285	Vertical

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