



EMC TEST REPORT

Report No.: 20230517G05337X -W1

Product Name: LoRa Controller

FCC ID: 2AYHY-UC50XV3

Main Model No. : UC501-915M

Series Model No. : NC501-915M, UC501-9M, NC501-9M, UC502-915M, NC502-915M, UC502-9M, NC502-9M

Applicant: Xiamen Milesight IoT Co., Ltd.

Address: Building C09, Software Park Phase III, Xiamen 361024, Fujian, China

Received Date: 2023.05.29

Dates of Testing: 2023.05.10—2023.05.11

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..... LoRa Controller

Main Model No. UC501-915M

Series Model No. NC501-915M, UC501-9M, NC501-9M, UC502-915M, NC502-915M, UC502-9M, NC502-9M

Trade name..... Milesight

Brand Name..... Milesight

Applicant..... Xiamen Milesight IoT Co., Ltd.

Applicant Address..... Building C09, Software Park Phase III, Xiamen 361024, Fujian, China

Manufacturer Xiamen Milesight IoT Co., Ltd.

Manufacturer Address Factory 401 & 501, No. 890, Tong Long Er Road, Factory Area, Xiamen Torch Development Zone for High Tech Industries (Xiang'an)

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

Test Result..... PASS

Tested by Ruihong Xie

Ruihong Xie Test Engineer 2023.06.20

Reviewed by Chris You

Chris You Senior Engineer 2023.06.20

Approved by Yang Fan

Yang Fan, Manager 2023.06.20



TABLE OF CONTENTS

- 1. GENERAL INFORMATION4**
- 1.1 EUT Description4**
- 1.2 Test Standards and Results.....5**
- Facilities and Accreditations6**
- 1.2.1 Facilities6
- 1.2.2 Test Environment Conditions.....6
- 1.2.3 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 Requirement10
- 3.1.2 Test Result10
- 3.2 Radiated Emission11**
- 3.2.1 Requirement11
- 3.2.2 Test Description12
- 3.2.3 Test Result.....12

Change History		
Issue	Date	Reason for change
1.0	2023.06.20	First edition



1. GENERAL INFORMATION

1.1 EUT Description

EUT Name : LoRa Controller
Trade Name.....: Milesight
Brand Name.....: Milesight
Hardware Version..... : N/A
Software Version : N/A

*Note1:*The EUT is a Choke Ring Antenna;

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

Note3 : All models differ in appearance and color, which do not affect EMC test results.

Note4: NC501-915M,UC501-9M,NC501-9M,UC502-915M,NC502-915M,UC502-9M,NC502-9M is electrically identical with the model: UC501-915M which was tested by CCIC Southern Testing Co., Ltd. with the same electromagnetic emissions and electromagnetic compatibility characteristics.



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
/	/	/	/	/

Support Cable:

Description	Shield Type	Ferrite Core	Length
/	/	/	/

2.2 Test Mode

The EUT have the following typical setups during the test:

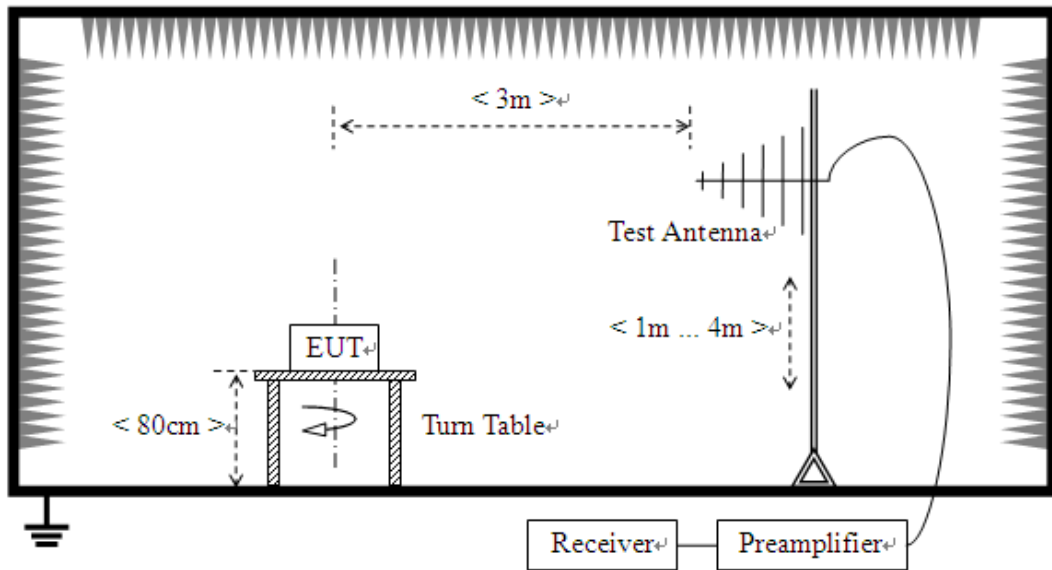
Setup1: EUT Working;

2.3 Test Setup and Equipments List

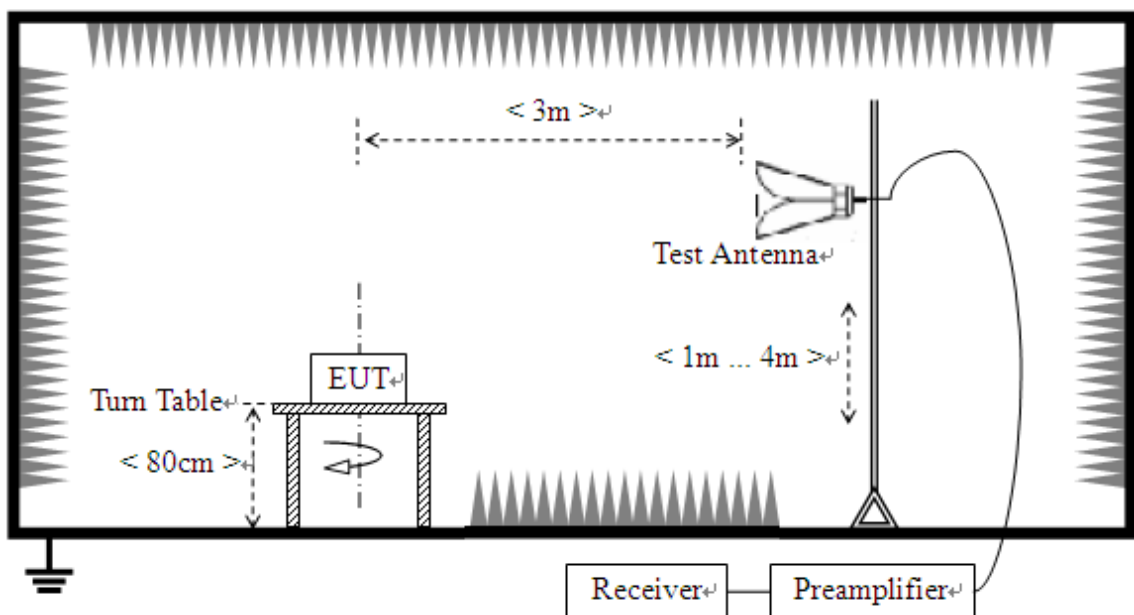
2.3.1 Radiated Emission

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

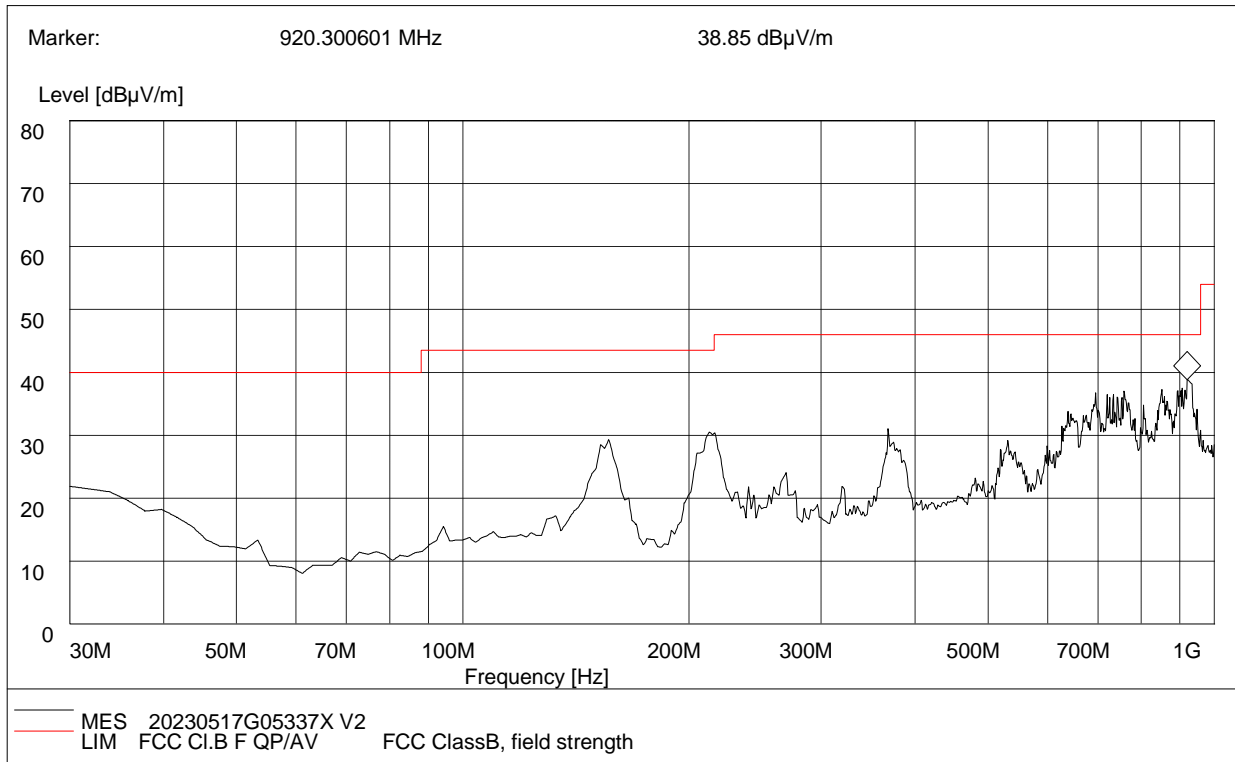
The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors. Both the vertical and the horizontal polarizations of the Test Antenna are considered to perform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

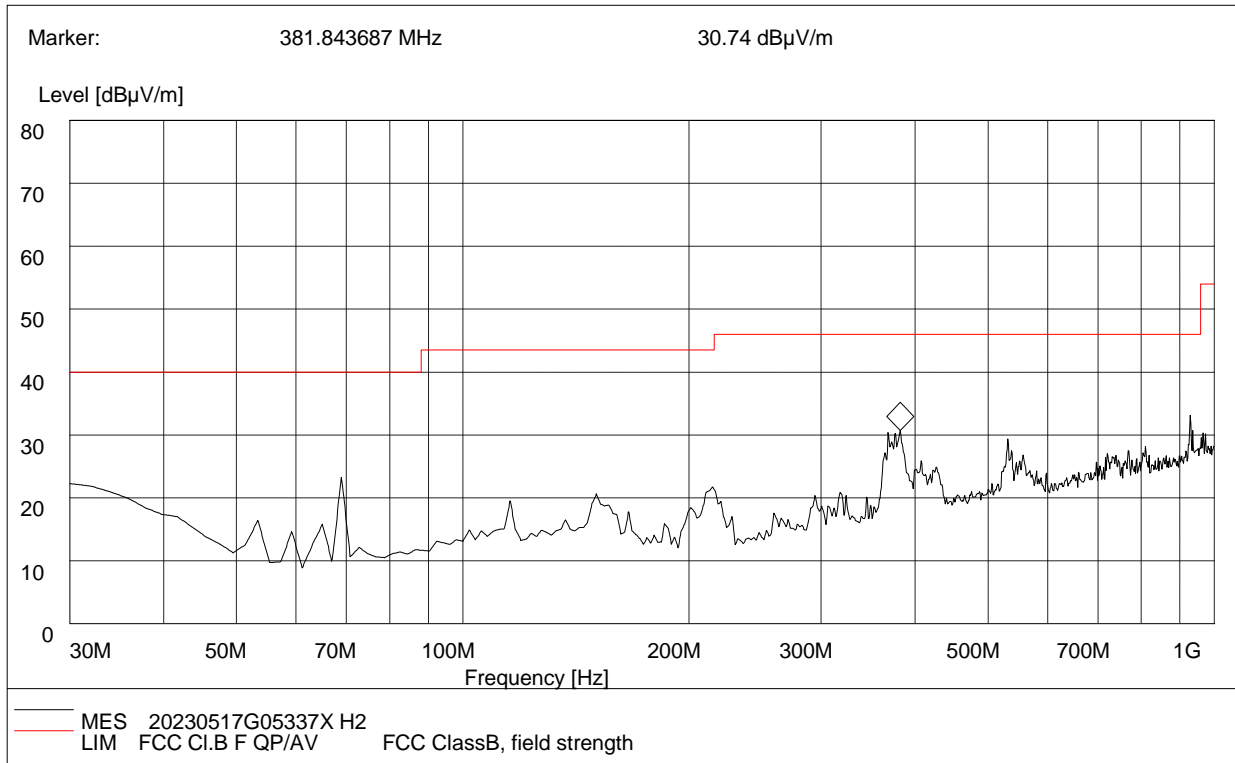


(Plot C: Test Antenna Vertical 30M - 1G)

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	21.87	120.000	103	40.0	18.13	Vertical	0.5	19.3	Pass
39.71	18.21	120.000	102	40.0	21.79	Vertical	0.5	14.0	Pass
156.35	28.34	120.000	100	43.5	15.16	Vertical	1.0	12.5	Pass
212.72	29.51	120.000	104	43.5	13.99	Vertical	1.2	12.1	Pass
216.61	29.36	120.000	100	46.0	16.64	Vertical	1.2	12.0	Pass
920.30	37.85	120.000	108	46.0	8.15	Vertical	2.3	25.3	Pass



B.Radiation disturbances, antenna polarization: Horizontal, Setup1

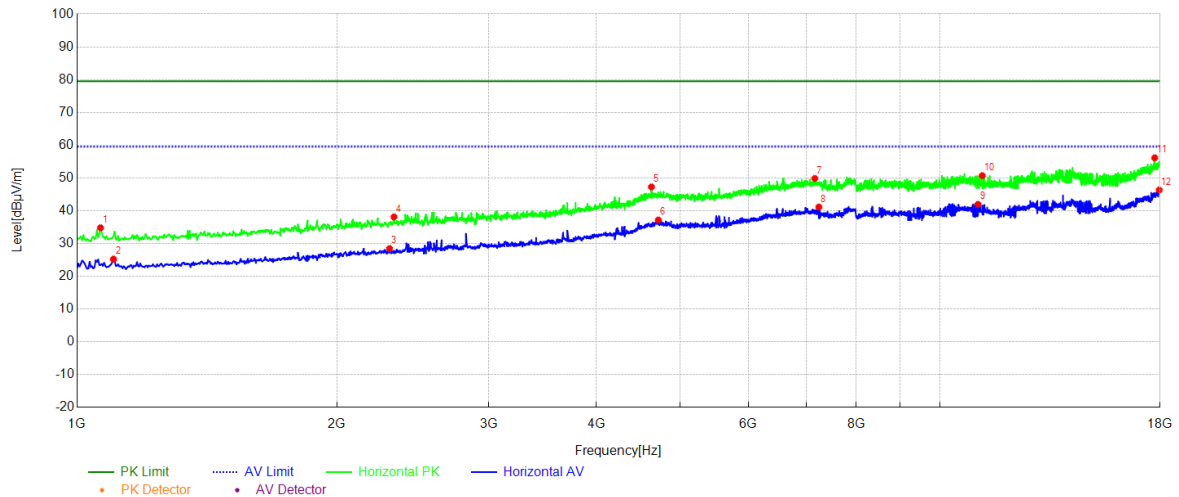


(Plot D: Test Antenna Horizontal 30M - 1G)

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Margin (dB)	Antenna	Cable Loss(dB)	ANT. Factor(dB)	Verdict
30.16	21.26	120.000	102	40.00	18.74	Vertical	0.5	19.3	Pass
68.87	22.25	120.000	104	40.00	17.75	Vertical	0.8	6.6	Pass
150.52	19.64	120.000	101	43.50	23.86	Vertical	1.0	12.4	Pass
241.66	20.75	120.000	105	46.00	25.25	Vertical	1.2	11.8	Pass
381.84	29.74	120.000	112	46.00	16.26	Vertical	1.4	17.3	Pass
531.52	28.37	120.000	103	46.00	17.63	Vertical	1.5	19.7	Pass



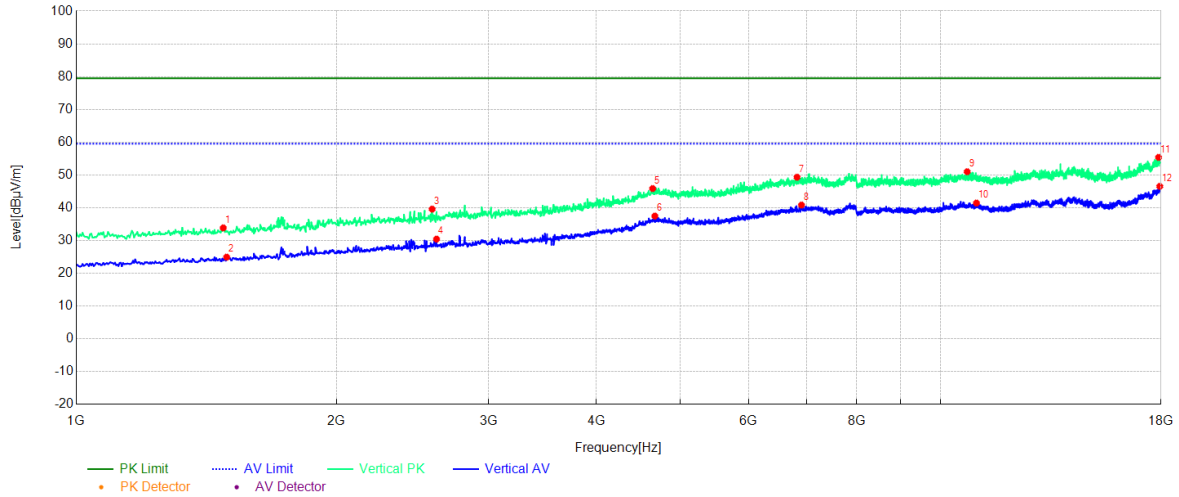
A.Radiation disturbances, antenna polarization: Horizontal



(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	1064.61	34.82	-15.29	79.50	44.68	PK	106	94	Horizontal
2	1102.02	25.25	-15.25	59.50	34.25	AV	105	94	Horizontal
3	2302.46	28.48	-10.95	59.50	31.02	AV	110	275	Horizontal
4	2329.67	38.12	-10.87	79.50	41.38	PK	103	203	Horizontal
5	4631.93	47.28	-1.39	79.50	32.22	PK	102	75	Horizontal
6	4716.94	37.17	-1.05	59.50	22.33	AV	106	222	Horizontal
7	7162.03	49.85	3.46	79.50	29.65	PK	103	30	Horizontal
8	7240.25	41.14	3.45	59.50	18.36	AV	112	69	Horizontal
9	11072.81	41.95	6.59	59.50	17.55	AV	109	275	Horizontal
10	11198.64	50.71	6.18	79.50	28.79	PK	109	169	Horizontal
11	17741.55	56.15	13.61	79.50	23.35	PK	100	97	Horizontal
12	17959.19	46.33	14.78	59.50	13.17	AV	107	134	Horizontal

B.Radiation disturbances, antenna polarization: Vertical,Setup1



(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	1479.50	33.87	-14.12	79.50	45.63	PK	104	336	Vertical
2	1493.10	24.94	-14.08	59.50	34.56	AV	105	244	Vertical
3	2581.32	39.58	-10.01	79.50	39.92	PK	108	235	Vertical
4	2611.92	30.44	-9.90	59.50	29.06	AV	106	250	Vertical
5	4645.53	45.85	-1.33	79.50	33.65	PK	110	235	Vertical
6	4672.73	37.46	-1.21	59.50	22.04	AV	100	156	Vertical
7	6825.37	49.31	3.04	79.50	30.19	PK	105	202	Vertical
8	6906.98	40.83	3.19	59.50	18.67	AV	103	304	Vertical
9	10739.5	50.98	6.38	79.50	28.52	PK	103	168	Vertical
10	11008.2	41.44	6.65	59.50	18.06	AV	106	84	Vertical
11	17884.3	55.37	14.48	79.50	24.13	PK	101	323	Vertical
12	17942.1	46.54	14.74	59.50	12.96	AV	102	81	Vertical

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