Test Report No.:
FCC2023-0026-EMC

EMC Test Report

EUT	:	**GOODS MONITORING G SERIES**
MODEL	:	**GM100**
BRAND NAME	:	**AOVX**
APPLICANT	:	**AOVX WIRELESS SOLUTIONS CO., LTD**
CLASSIFICATION OF TEST	:	**N/A**

CVC Testing Technology Co., Ltd.

Applicant	**Name: AOVX WIRELESS SOLUTIONS CO., LTD** **Address: Room 501, BlockA1, ZhongAn Valley, 900 Wangjiang West Road, High-tech Zone, HeFei, China 230088**
Manufacturer	**Name: AOVX WIRELESS SOLUTIONS CO., LTD** **Address: Room 501, BlockA1, ZhongAn Valley, 900 Wangjiang West Road, High-tech Zone, HeFei, China 230088**
Equipment Under Test	**Product Name: GOODS MONITORING G SERIES** **Model/Type: GM100** **Brand Name: AOVX** **Serial NO.: N/A** **Sample NO.:5-1**

Date of Receipt.	**2023.05.23**	Date of Testing	**2022.05.23～2022.05.30**

Test Specification	**Test Result**
FCC Part 15, Subpart B, Class B (SDOC)	PASS

Evaluation of Test Result	The equipment under test was found to comply with the requirements of the standards applied. Seal of CVC **Issue Date: 2023.05.31**

Tested by:	Reviewed by:	Approved by:
Xu ZhenFei	Liu yonghai	Chenhuawen
Xu ZhenFei	**Liu YongHai**	**Chen HuaWen**
Name Signature	Name Signature	Name Signature

Other Aspects: NONE.

Abbreviations:OK, Pass= passed Fail = failed N/A= not applicable EUT= equipment, sample(s) under tested

This test report relates only to the EUT, and shall not be reproduced except in full, without written approval of CVC.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FCC2023-0026-EMC	Original release	2023.05.31

1. SUMMARY OF TEST RESULTS

EMISSION			
Standard	Test Item	Result	Remarks
FCC Part 15, Subpart B, Class B (SDOC)	Conducted test	PASS	Minimum passing margin is 10.3dB at 0.461MHz
	Radiated Test (30MHz~ 1GHz)	PASS	Minimum passing margin is 8.33dB at 945.5776MHz
	Radiated Test (Above 1GHz)	PASS	Minimum passing margin is 15.02dB at 4840.3840MHz

1.1 List of Test and Measurement Instruments

Test Equipment	Type/Mode	SERIAL NO.	Equipment No.	Manufacturer	Cal. Due
Radiation emission					/
EMI Test Receiver（3M）	N9038A-508	MY532290079	EM-000397	Agilent	2024-02-22
Spectrum Analyzer	N9010B	MY57470323	DZ-000174	KEYSIGHT	2024-02-22
Radio Communication Test	CMW500	156686	EM-000623	R&S	2023-12-06
Broadband Antenna(3m)	VULB 9163	9163-530	EM-000342	SCHWARZBECK	2023-06-25
Loop Antenna	HLA 6121	540046	EM-000546	TESEQ	2023-06-06
Loop Antenna	FMZB1513	1513-170	EM-000384	SCHWARZBECK	2024-02-24
H-field antenna	FESP 5133-7/41	00458	EM-000674-4	SCHWARZBECK	2023-06-06
Monopole antenna	HFH2-Z6E	101317	EM-000613	R&S	2024-03-02
Waveguide Horn Antenna	BBHA9120B	602	EM-000383	SCHWARZBECK	2024-01-11
Waveguide Horn Antenna	HF906	360306/008	WKNA-0024-8	R&S	2024-02-24
Semi-Anechoic Chamber(3m)	FACT-4	ST08035	WKNA-0024	ETS	2024-12-11
Conducted emission					/
EMI Test Receiver	ESW44	103123	EM-000698	R&S	2023-06-17
EMI Test Receiver	ESR3	102394	VGDY-0705	R&S	2024-02-22
LISN	NSLK 8127	8127644	VGDY-0150	SCHWARZBECK	2023-09-03
LISN	NSLK 8128	8128-316	VGDY-0149	SCHWARZBECK	2023-09-03
DC LISN	PVDC8301-017	PVDC8301#17	VGDY-0692	SCHWARZBECK	2023-10-07
LISN	NSLK 8129	8129-268	EM-000388	SCHWARZBECK	2024-02-22
Plus Limiter（#1）	VTSD 9561 F-N	00515	VGDY-0808	SCHWARZBECK	2024-03-03
Plus Limiter（#2）	VTSD 9561	9561-F017	VGDY-0152	SCHWARZBECK	2024-09-03
Impedance Stabilization Network	ISN T800	27095	WKNE-0195	TESEQ	2023-09-03
Impedance Stabilization Network	NTFM8158	8158-0092	VGDY-0356	SCHWARZBECK	2023-06-06
ImpedanceStabilizationNetwork	NTFM8131	#184	EM-000498	SCHWARZBECK	2023-06-06
Voltage Probe	TK9420	9420-499	VGDY-0128	SCHWARZBECK	2024-02-22
Power Divider	4901.17.B	22643830	DB-0016	HUBER+SUHNER	2023-08-31
Audio SignalGenerator	GAG-810	EK871591	EM-000309	GW	2023-12-06
Shielding Room(#1)	GP1A	001	WKNF-0001	LEINING	2024-08-07
Shielding Room(#2)	GP1A	002	WKNF-0006	LEINING	2024-08-07
Current probe	EZ-17	0816.2063.02	EM-000567	R&S	2024-01-07
LISN	NNHV8123-200	8123200-020	EM-000385	SCHWARZBECK	2024-02-22
LISN	NNHV8123-200	8123200-021	EM-000386	SCHWARZBECK	2024-02-22

1.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

No.	Item	Measurement Uncertainty	No.
1	Conducted Emissions	9kHz~30MHz	±2.66dB
2	Radiated Spurious Emissions	9KHz ~ 30MHz	±0.769dB
		30MHz ~ 1GMHz	±0.877dB
		1GHz ~ 18GHz	±0.777dB
		18GHz ~ 40GHz	±1.315dB
Remark: 95% Confidence Levels, k=2.			

1.3 Test Location

The tests and measurements refer to this report were performed by EMC testing Lab. of CVC Testing Technology Co., Ltd.

Address: No.3, TiantaiyiRoad, KaitaiAvenue, ScienceCity, Guangzhou, China
Post Code：510663 Tel：020-32293888
FAX：020-32293889 E-mail：office@cvc.org.cn
Test Firm Registration Number: 937273

2. GENERAL INFORMATION

2.1 General Product Information

PRODUCT	GOODS MONITORING G SERIES		
BRAND	AOVX		
TEST MODEL	GM100		
ADDITIONAL MODEL	N/A		
POWER SUPPLY	1. DC 3.7V from Li-ion battery 2. DC 5V from USB host unit		
FCC ID	2BAXKYX2305GM100		
MODULATION TYPE	GSM	GMSK, 8PSK	
	LTE	QPSK, 16QAM	
LTE CATEGORY	M1		
OPERATING FREQUENCY	MODE	TX(MHz)	RX(MHz)
	GSM850	824 ~ 849	869 ~ 894
	GSM1900	1850 ~ 1910	1930 ~ 1990
	LTE B2	1850 ~ 1910	1930 ~ 1990
	LTE B4	1710 ~ 1755	2110 ~ 2155
	LTE B12	699 ~ 716	729 ~ 746
	LTE B13	777 ~ 787	746 ~ 756
I/O PORTS	Refer to user's manual		
CABLE SUPPLIED	N/A		

Remark:
1. For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
3. EUT photo refer to the report (Report NO.: FCC2023-0026-E).

2.2 Description of Accessories

N/A

2.3 Independent Operation Modes

The EUT were tested under the following modes, the final worst mode was marked in boldface and recorded in this report.

EMISSION Test Modes		
For Conducted Emission Tests		
Test Mode		Test Voltage
1	**Normal Working + Charging + GNSS IDLE**	**DC 5V from USB host unit**
2	Normal Working + GNSS IDLE	DC 3.7V from Li-ion battery
For Radiated Emission Tests		
Test Mode		Test Voltage
1	**Normal Working + Charging + GNSS IDLE**	**DC 5V from USB host unit**
2	Normal Working + GNSS IDLE	DC 3.7V from Li-ion battery

2.4 General Description of Applied Standards

According to the specifications of the manufacturers, the EUT must comply with the requirements of the following standards:

FCC PART 15, SUBPART B, CLASS B (SDOC)

ANSI C63.4:2014 •

All test items have been performed and recorded as per the above standards.

2.5 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Support Equipment					
NO	**Description**	**Brand**	**Model No.**	**Serial Number**	**Supplied by**
1	Adapter	Apple	A1443	N/A	Lab

Support Cable							
NO	**Description**	**Quantity (Number)**	**Length (m)**	**Detachable (Yes/ No)**	**Shielded (Yes/ No)**	**Cores (Number)**	**Supplied by**
1	USB CABLE	1	1.0	No	No	N/A	Lab

3. EMISSION

3.1 Conducted Emission

3.1.1 Limits Of Conducted Emission

TEST STANDARD: FCC Part 15, Subpart B (Section: 15.107)

Frequency (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50
NOTE: 1. The lower limit shall apply at the transition frequencies. NOTE: 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz. NOTE: 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.				

3.1.2 Test Procedures

The basic test procedure was in accordance with ANSI C63.4:2014 (section 7).

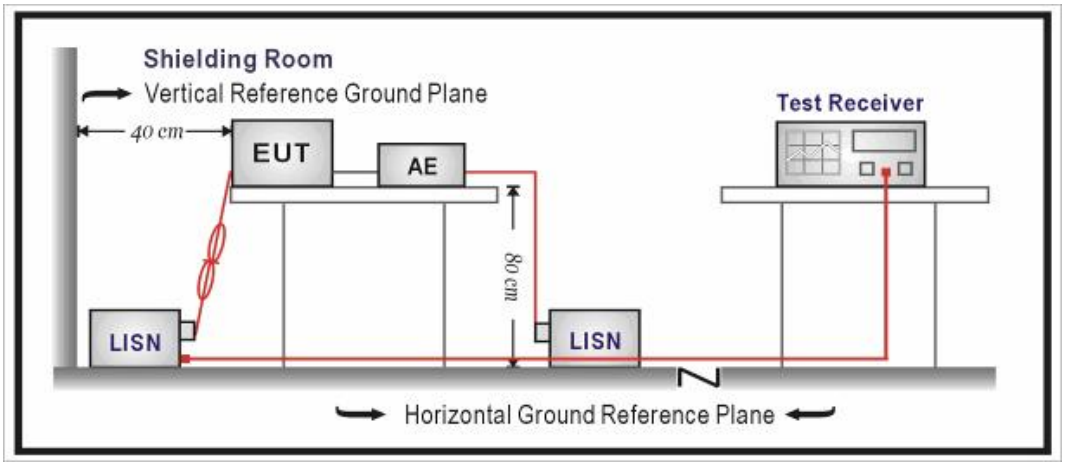
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

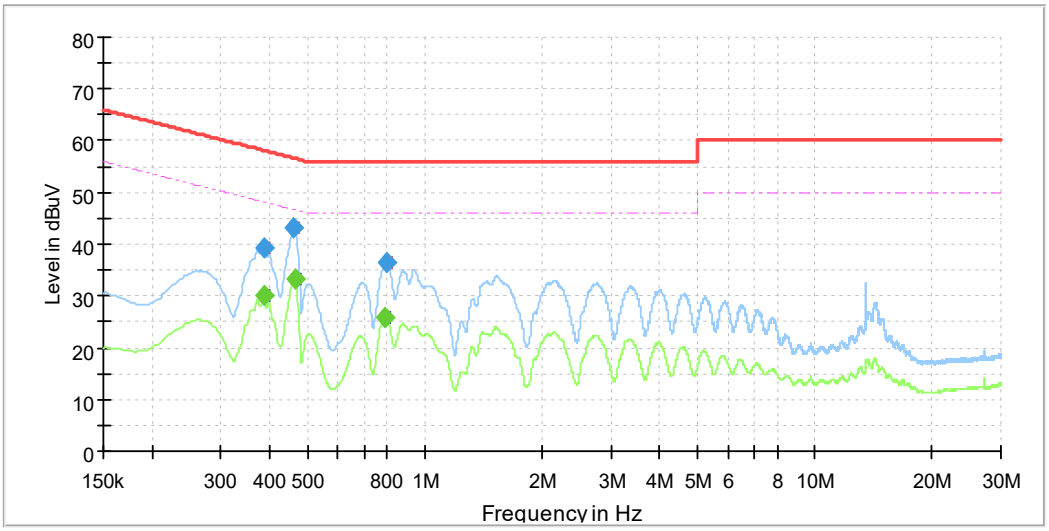
3.1.3 Test setup



3.1.4 Test Results

CONDUCTED WORST-CASE DATA:

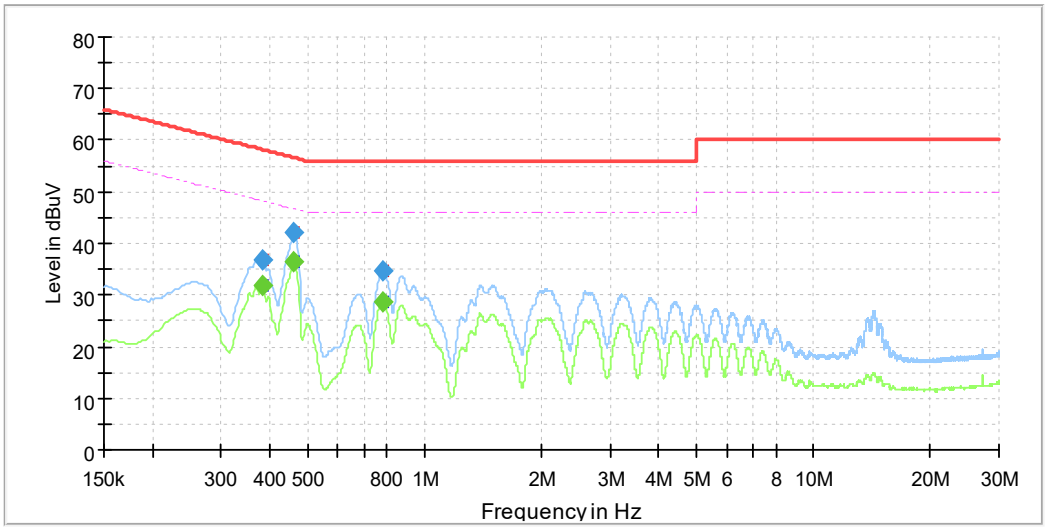
Test Mode	See section 2.3	**Frequency Range**	150KHz ~ 30MHz
Test Voltage	See section 2.3	**PHASE**	Line (L)
Environmental Conditions	25.3deg. C,55% RH	**Tested By**	Liu shiwei



NO	Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr.Factor (dB)
1	0.386	39.3	---	58.1	18.9	L1	20.5
2	0.386	---	29.9	48.1	18.2	L1	20.5
3	0.463	43.0	---	56.6	13.6	L1	20.5
4	0.465	---	33.1	46.6	13.5	L1	20.5
5	0.791	---	25.8	46.0	20.2	L1	20.7
6	0.796	36.3	---	56.0	19.7	L1	20.7

Remark: The emission levels of other frequencies were very low against the limit.

Test Mode	See section 2.3	**Frequency Range**	150KHz ~ 30MHz
Test Voltage	See section 2.3	**PHASE**	Line (N)
Environmental Conditions	26deg. C,51% RH	**Tested By**	Liu shiwei



NO	Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr.Factor (dB)
1	0.384	36.9	---	58.2	21.3	N	20.6
2	0.384	---	31.9	48.2	16.3	N	20.6
3	0.461	42.0	---	56.7	14.6	N	20.5
4	**0.461**	**---**	**36.4**	**46.7**	**10.3**	**N**	**20.5**
5	0.778	---	28.7	46.0	17.3	N	20.6
6	0.785	34.5	---	56.0	21.5	N	20.6

Remark: The emission levels of other frequencies were very low against the limit.

3.2 Radiated Emission

3.2.1 Limits Of Radiated Emission

TEST STANDARD:
FCC Part 15, Subpart B (Section: 15.109), for above 1GHz(section 3.2.2 Table 4)
FCC Part 15, Subpart B

Frequency (MHz)	Distance (m)	Class A (dBuV)	Class B (dBuV)
30 - 88	3	QP: 49.5	QP: 40
88 - 216	3	QP: 54	QP: 43.5
216 - 960	3	QP: 56.9	QP: 46
960-1000	3	QP: 60	QP: 54
Above 1000	3	Avg: 60 Peak: 80	Avg: 54 Peak: 74
NOTE: 1. The lower limit shall apply at the transition frequencies. NOTE: 2. Emission level (dBuV/m) = 20 log Emission level (uV/m). NOTE: 3. All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.			

3.2.2 Test Procedures

The basic test procedure was in accordance with ANSI C63.4:2014 (section 12).

1. From 30 MHz to 1GHz test procedure as below:

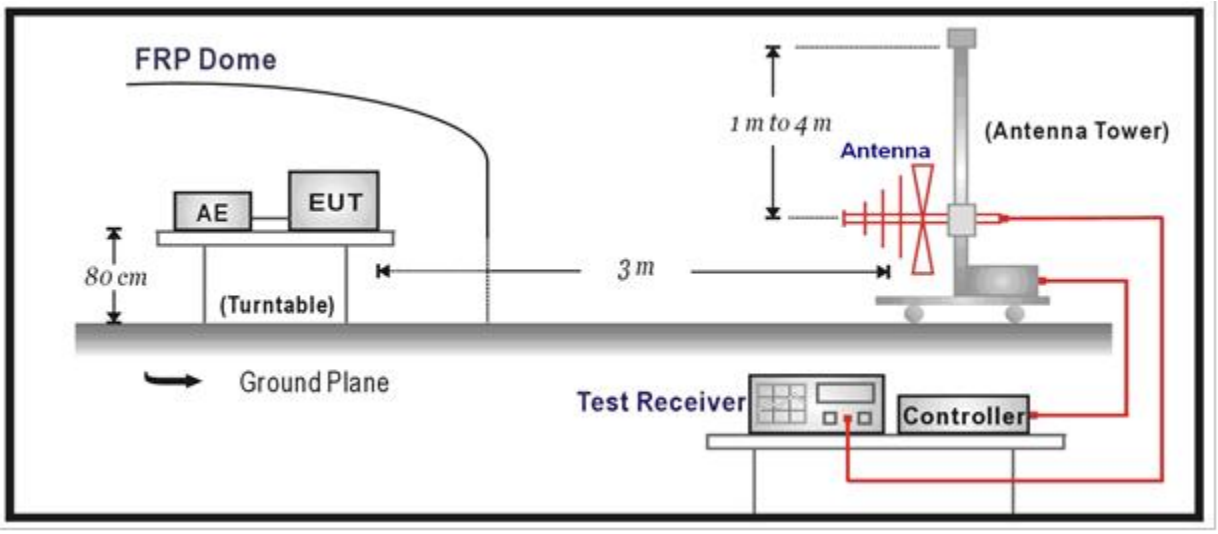
1) The radiated emissions were tested in a semi-anechoic chamber.
2) The Product was placed on the non-conductive turntable 0.1 m above the ground at a chamber.
3) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
4) For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

2. Above 1GHz test procedure as below:

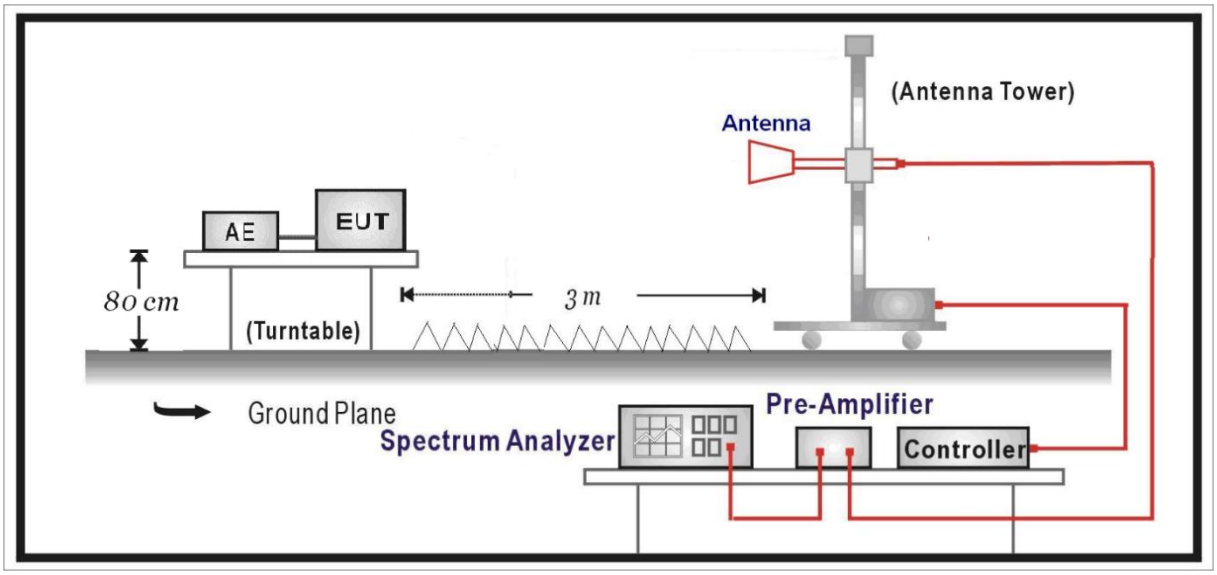
1) The radiated emissions were tested in a fully Anechoic Chamber.
2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
3) For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

3.2.3 Test Setup

Below 1GHz Test Setup:



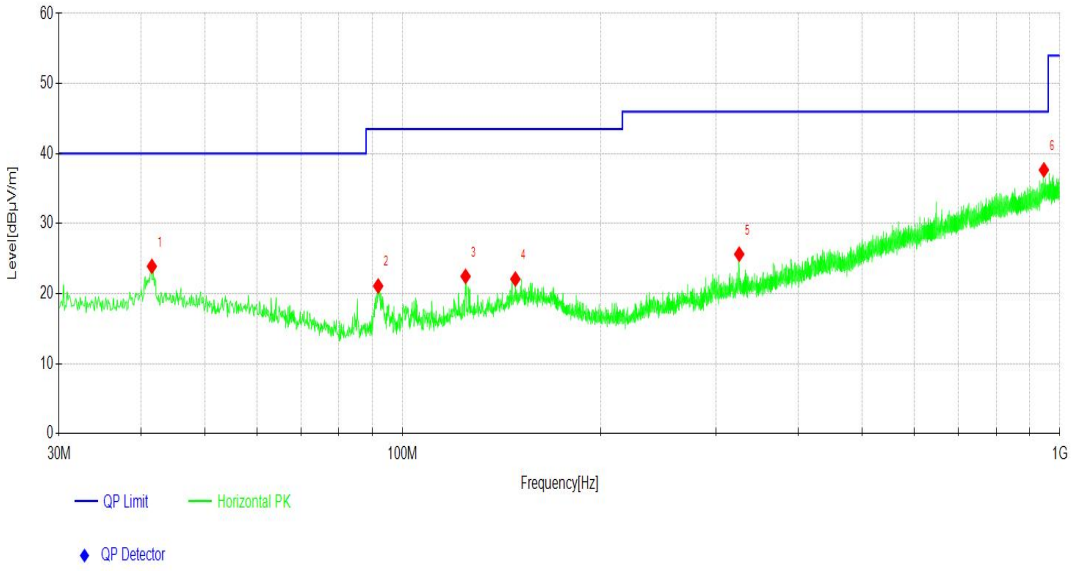
Above 1GHz Test Setup:



3.2.4 Test Results (Below 1GHz)

Test Mode	See section 2.3	**Frequency Range**	30-1000MHz
Test Voltage	See section 2.3	**Detector Function**	Quasi-Peak(QP)
Environmental Conditions	25.1deg. C,60% RH	**Tested By**	Liu Shiwei

Horizontal

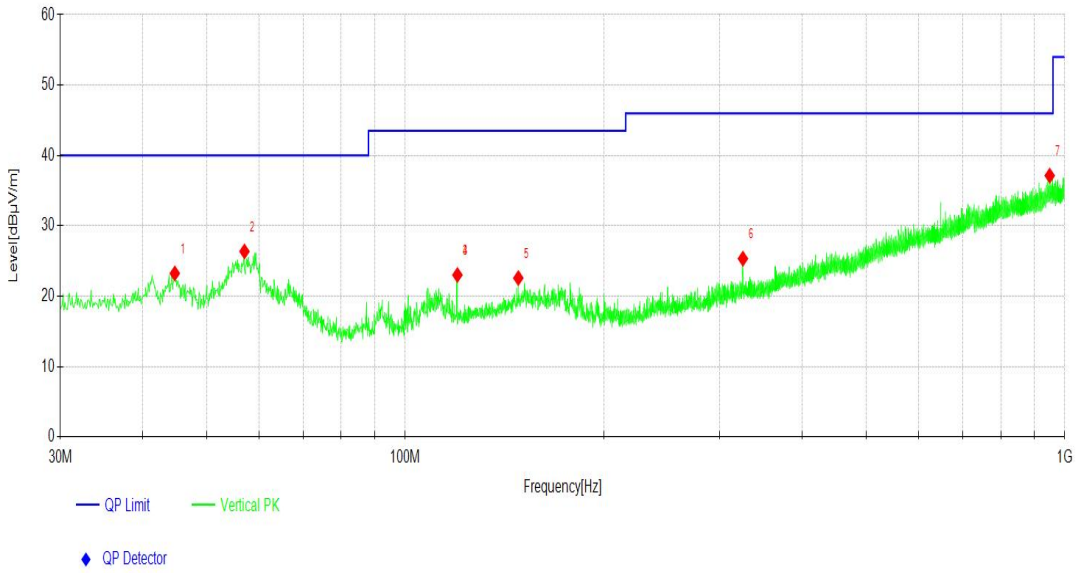


NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]
1	41.5442	5.12	18.77	23.89	40.00	16.11	200	58
2	91.7952	6.48	14.60	21.08	43.50	22.42	200	30
3	124.6815	5.42	17.04	22.46	43.50	21.04	200	292
4	148.4488	2.91	19.17	22.08	43.50	21.42	100	127
5	325.2005	5.36	20.27	25.63	46.00	20.37	100	96
6	**945.5776**	**5.42**	**32.25**	**37.67**	**46.00**	**8.33**	**200**	**100**

Remark: 1. The emission levels of other frequencies were greater than 20dB margin.
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
4. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]

Test Mode	See section 2.3	**Frequency Range**	30-1000MHz
Test Voltage	See section 2.3	**Detector Function**	Quasi-Peak(QP)
Environmental Conditions	24.2deg. C,55% RH	**Tested By**	Liu Shiwei

Vertical



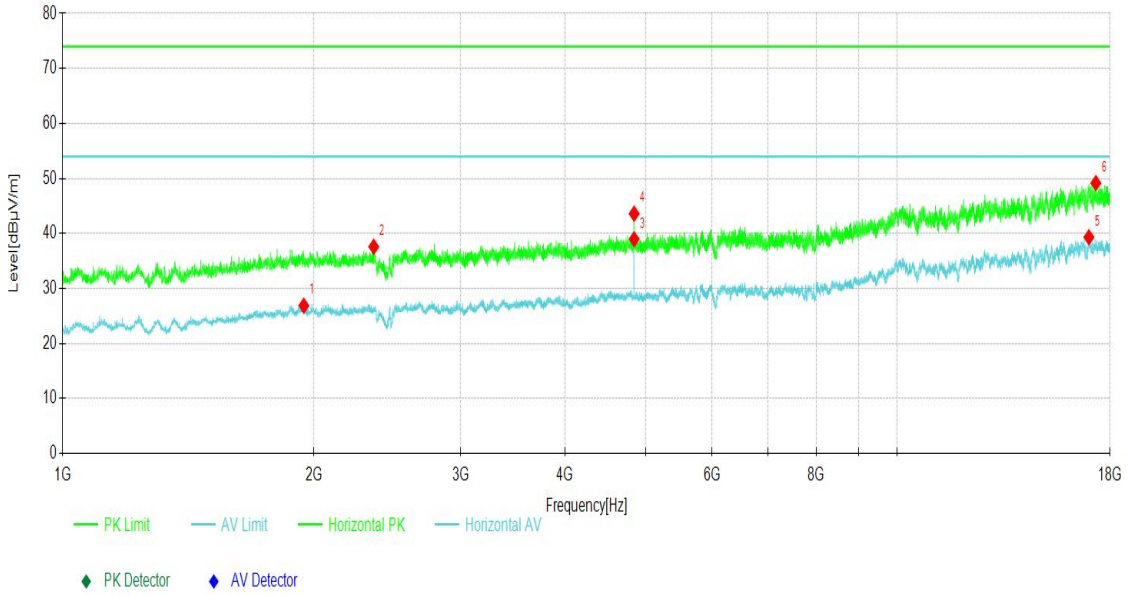
NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]
1	44.7455	4.32	18.92	23.24	40.00	16.76	100	3
2	57.0657	8.37	17.99	26.36	40.00	13.64	100	266
3	120.0250	6.18	16.83	23.01	43.50	20.49	100	202
4	120.0250	6.18	16.83	23.01	43.50	20.49	100	202
5	148.4488	3.41	19.17	22.58	43.50	20.92	100	172
6	325.2005	5.07	20.27	25.34	46.00	20.66	200	358
7	949.0699	4.73	32.41	37.14	46.00	8.86	200	232

Remark: 1. The emission levels of other frequencies were greater than 20dB margin.
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
4. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]

3.2.5 Test Results (Above 1GHz)

Test Mode	See section 2.3	**Frequency Range**	Above 1GHz
Test Voltage	See section 2.3	**Detector Function**	PK/AV
Environmental Conditions	25.1deg. C,60% RH	**Tested By**	Liu Shiwei

Horizontal

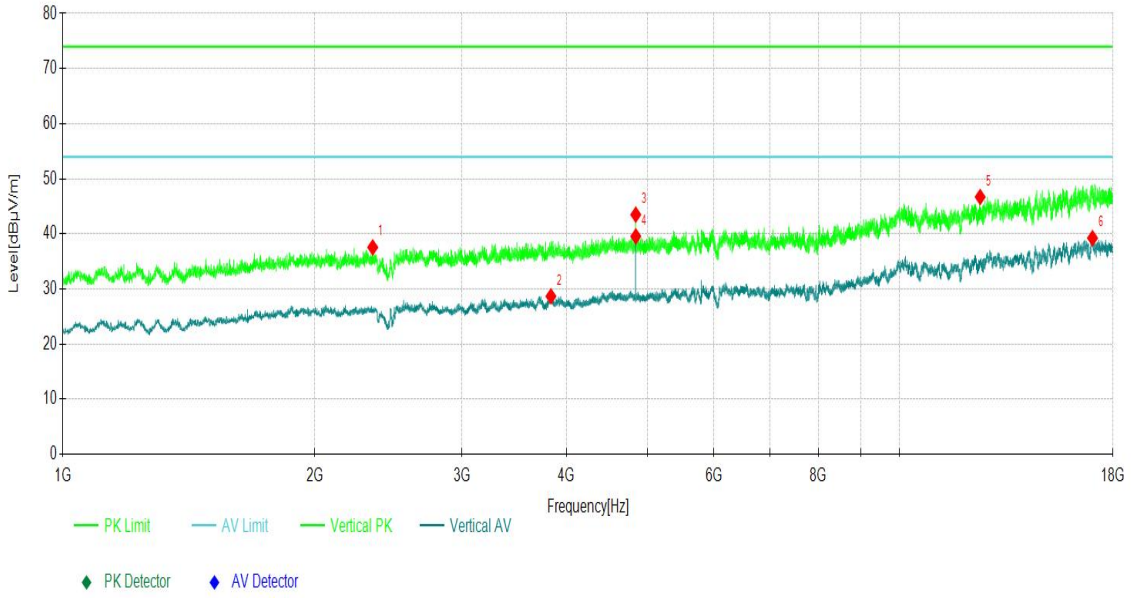


NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	1945.6946	40.19	-13.31	26.88	54.00	27.12	200	329	AV
2	2359.7360	52.09	-14.49	37.60	74.00	36.40	100	45	PK
3	**4840.3840**	**48.88**	**-9.90**	**38.98**	**54.00**	**15.02**	**100**	**3**	**AV**
4	4840.3840	53.51	-9.90	43.61	74.00	30.39	100	3	PK
5	16973.5974	32.65	6.68	39.33	54.00	14.67	200	320	AV
6	17301.4301	42.48	6.69	49.17	74.00	24.83	200	192	PK

Remark: 1. Above 18GHz have been test and test data more than 20dB margin.
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
4. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]

Test Mode	See section 2.3	**Frequency Range**	Above 1GHz
Test Voltage	See section 2.3	**Detector Function**	PK/AV
Environmental Conditions	24.2deg. C,55% RH	**Tested By**	Liu Shiwei

Vertical



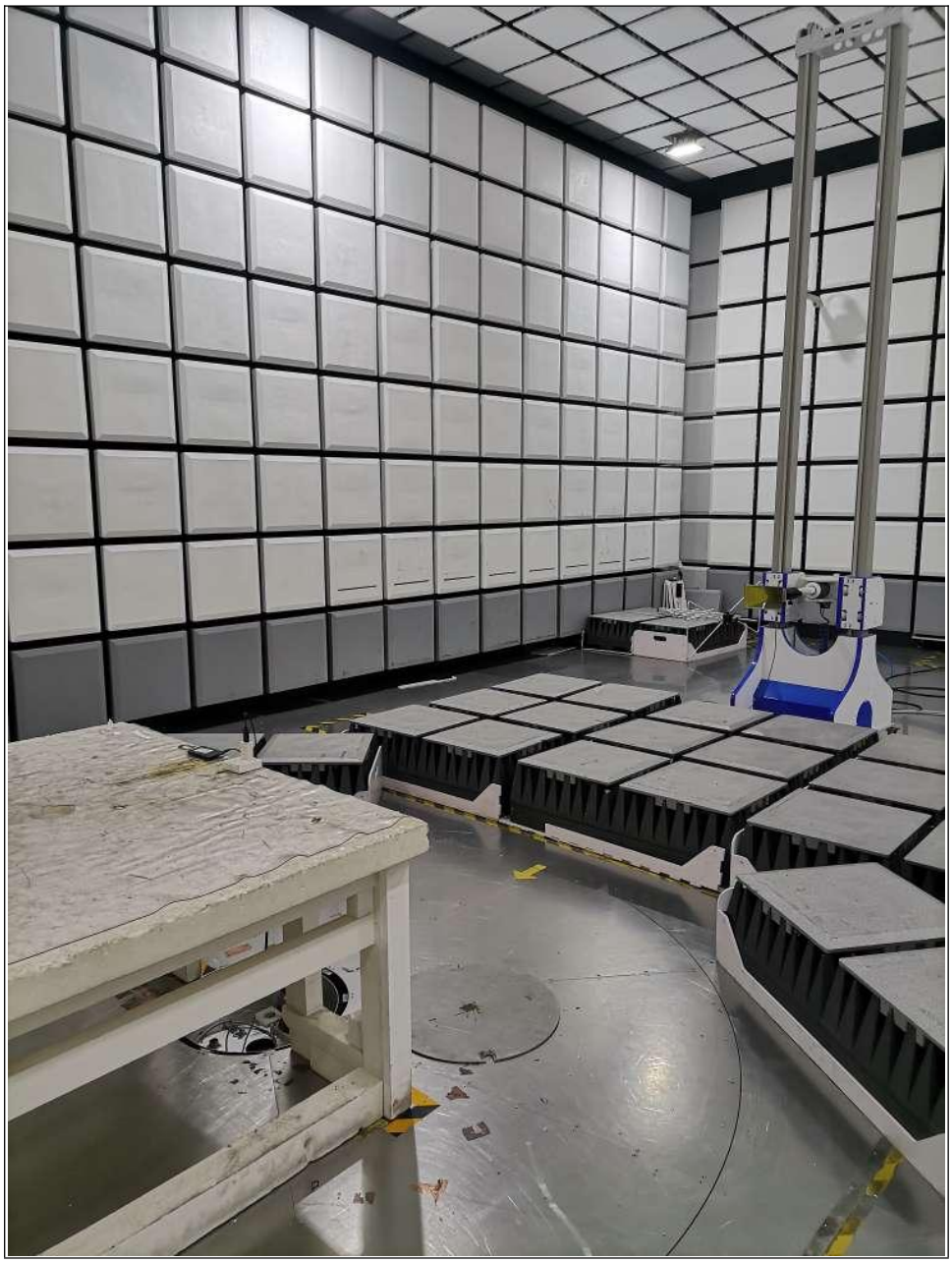
NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	2346.5347	52.08	-14.51	37.57	74.00	36.43	200	233	PK
2	3832.2832	40.61	-11.92	28.69	54.00	25.31	100	86	AV
3	4839.7840	53.41	-9.90	43.51	74.00	30.49	100	297	PK
4	4840.3840	49.47	-9.90	39.57	54.00	14.43	100	265	AV
5	12488.4488	45.19	1.52	46.71	74.00	27.29	200	248	PK
6	17014.3014	32.71	6.54	39.25	54.00	14.75	200	203	AV

Remark: 1. Above 18GHz have been test and test data more than 20dB margin.
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).
3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
4. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]

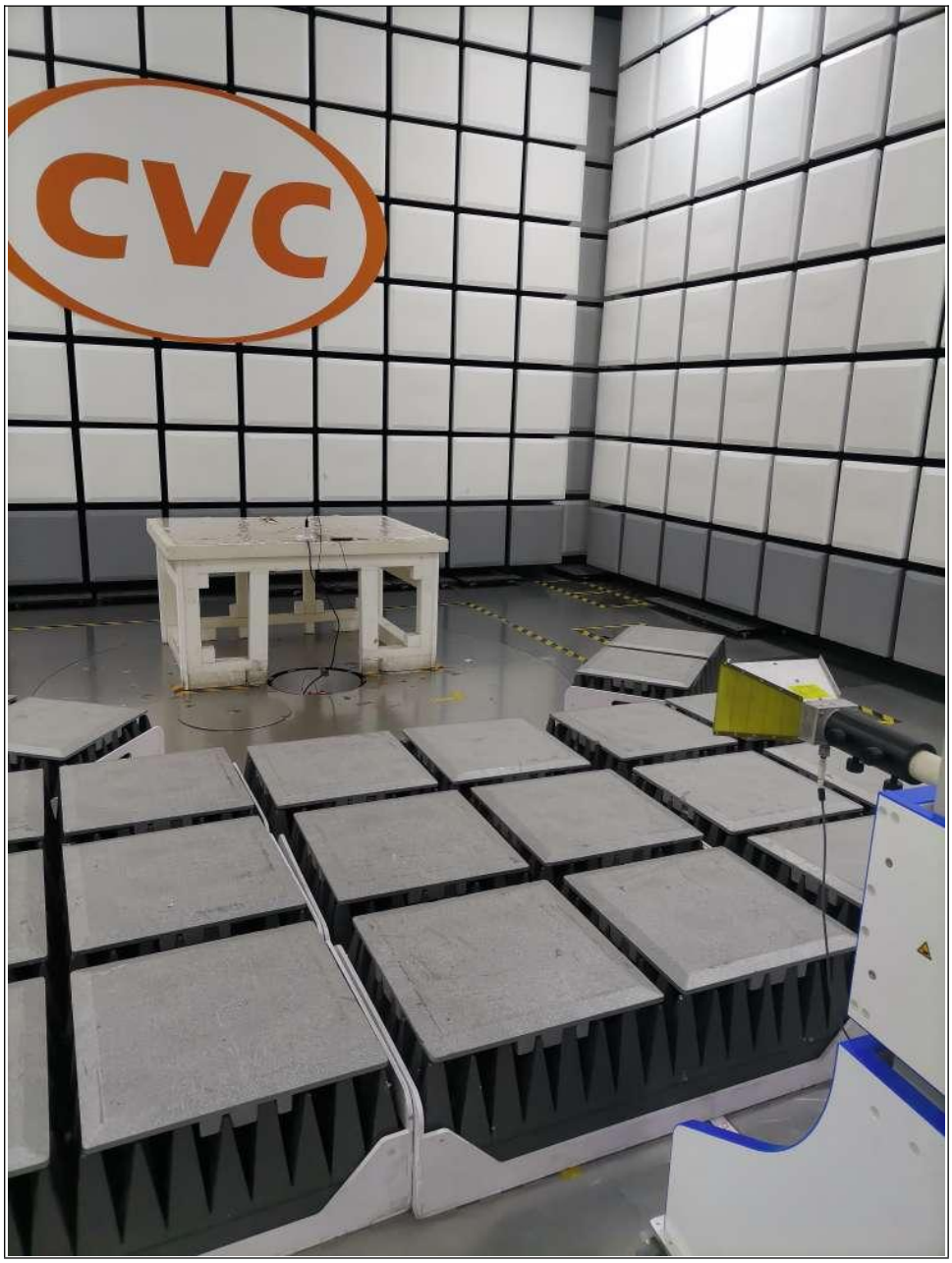
4. PHOTOGRAPHS OF TEST SETUP

RADIATED EMISSION TEST (Below 1GHz)

RADIATED EMISSION TEST (Below 1GHz)



RADIATED EMISSION TEST (Above 1GHz)



RADIATED EMISSION TEST (Above 1GHz)

5. PHOTOGRAPHS OF THE EUT

Please refer to the attached file (External Photos and Internal Photos).

Important

(1) The test report is valid without the official stamp of CVC;

(2) Any part photocopies of the test report are forbidden without the written permission from CVC;

(3) The test report is invalid without the signatures of Approval and Reviewer;

(4) The test report is invalid if altered;

(5) Objections to the test report must be submitted to CVC within 15 days.

(6) Generally, commission test is responsible for the tested samples only.

(7) As for the test result "-" or "N" means "not applicable", "/" means "not test", "P" means "pass" and "F" means "fail"

The test data and test results given in this test report should only be used for purposes of scientific research, teaching and internal quality control when the CMA symbol is not presented.

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