



Test Report No.:
FCC2023-0048-EMC

EMC Test Report

EUT : **Smart Sense Asset Monitoring Tag**
MODEL : **SAM500**
BRAND NAME : **Tag-N-Trac**
APPLICANT : **Tag-N-Trac Inc.**
CLASSIFICATION OF TEST : **N/A**

CVC Testing Technology Co., Ltd.



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Test Report No.: FCC2023-0048-EMC

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Applicant		Name: Tag-N-Trac Inc. Address: 4250 Executive Sq, #675, La Jolla, CA 92037, US	
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: Smart Sense Asset Monitoring Tag Model/Type: SAM500 Brand Name: Tag-N-Trac Serial NO.: N/A Sample NO.:4-1	
Date of Receipt.	2023.07.21	Date of Testing	2023.07.21 ~ 2023.08.04
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: 2023.08.04		
Tested by:  Lu Wei Ji Name Signature	Reviewed by:  Xu Zhen Fei Name Signature	Approved by:  Chen Hua Wen 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
FCC2023-0048-EMC	Original release	2023.08.04



1. SUMMARY OF TEST RESULTS

EMISSION			
Standard	Test Item	Result	Remarks
FCC Part 15, Subpart B, Class B (SDOC)	Radiated Test (30MHz~ 1GHz)	PASS	Minimum passing margin is 8.90dB at 957.2712MHz
	Radiated Test (Above 1GHz)	PASS	Minimum passing margin is 4.01dB at 4927.9928MHz

1.1 List of Test and Measurement Instruments

Test Equipment	Type/Mode	SERIAL NO.	Equipment No.	Manufacturer	Cal. interval	Cal. Due
Radiation emission						
EMI Test Receiver (3M)	N9038A-508	MY532290079	EM-000397	Agilent	1 year	2024-02-22
Spectrum Analyzer	N9010B	MY57470323	DZ-000174	KEYSIGHT	1 year	2024-02-22
Radio Communication Test	CMW500	156686	EM-000623	R&S	1 year	2023-12-06
Broadband Antenna(3m)	VULB 9163	9163-530	EM-000342	SCHWARZBECK	1 year	2024-06-25
Loop Antenna	HLA 6121	540046	EM-000546	TESEQ	1 year	2024-06-05
Loop Antenna	FMZB1513	1513-170	EM-000384	SCHWARZBECK	1 year	2024-02-24
H-field antenna	FESP 5133-7/41	00458	EM-000674-4	SCHWARZBECK	1 year	2024-06-05
Monopole antenna	HFH2-Z6E	101317	EM-000613	R&S	1 year	2024-03-02
Waveguide Horn Antenna	BBHA9120B	602	EM-000383	SCHWARZBECK	1 year	2024-01-11
Waveguide Horn Antenna	HF906	360306/008	WKNA-0024-8	R&S	1 year	2024-02-24
Semi-Anechoic Chamber(3m)	FACT-4	ST08035	WKNA-0024	ETS	3 year	2024-12-11
Vector Signal Generator	N5172B	MY53051933	EM-000487-1	KEYSIGHT	1 year	2023-12-06



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	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	Smart Sense Asset Monitoring Tag
BRAND	Tag-N-Trac
TEST MODEL	SAM500
ADDITIONAL MODEL	N/A
FCC ID	2A24I-V08G07J17
POWER SUPPLY (See section 2.2)	DC 3.6V from battery (non-rechargeable)
LTE CATEGORY	CAT 1
OPERATING FREQUENCY	See section 2.3
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.: FCC2023-0048-EUT).	

2.2 DESCRIPTION OF ACCESSORIES

No.	Battery	
1	Model No.:	ER14505-5
	Voltage:	3.6V
NOTE: Battery is non-rechargeable		



2.3 OPERATING FREQUENCY

Mode	Band	TX(MHz)	RX(MHz)
GSM	GSM 850	824 ~ 849	869 ~ 894
	GSM 1900	1850 ~ 1910	1930 ~ 1990
LTE Band	LTE B2	1850 ~ 1910	1930 ~ 1990
	LTE B4	1930 ~ 1990	1930 ~ 1990
	LTE B5	1930 ~ 1990	1930 ~ 1990
	LTE B7	2500 ~ 2570	2620 ~ 2690
	LTE B12	699 ~ 716	729 ~ 746
	LTE B13	777 ~ 787	746 ~ 756
	LTE B25	1850 ~ 1915	1930 ~ 1995
	LTE B26	814~ 824	859 ~ 869
		824~ 849	869 ~ 894
LTE B66	1710 ~ 1780	2110 ~ 2180	



2.4 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 Radiated Emission Tests	
Test Mode	Test Voltage
1	Normal Working + GNSS IDLE
	DC 3.6V from battery (non-rechargeable)



2.5 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.

2.6 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	N/A	N/A	N/A	N/A	N/A



3. EMISSION

3.1 RADIATED EMISSION

3.1.1 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.

3.1.2 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:

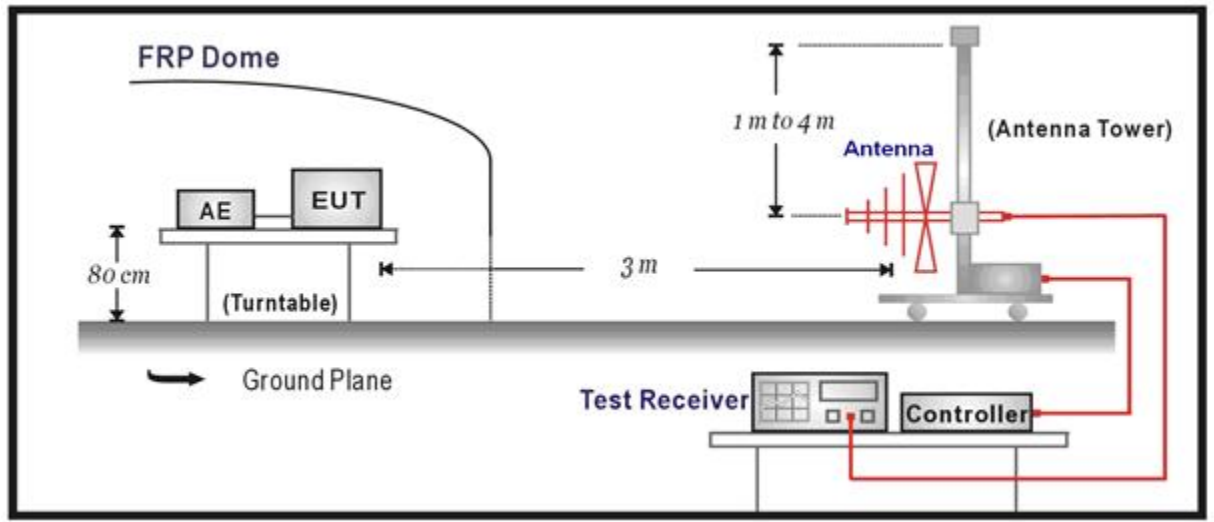
- 1) The radiated emissions were tested in a semi-anechoic chamber.
- 2) The Product was placed on the non-conductive turntable 0.1 m above the ground at a chamber.
- 3) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan 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:

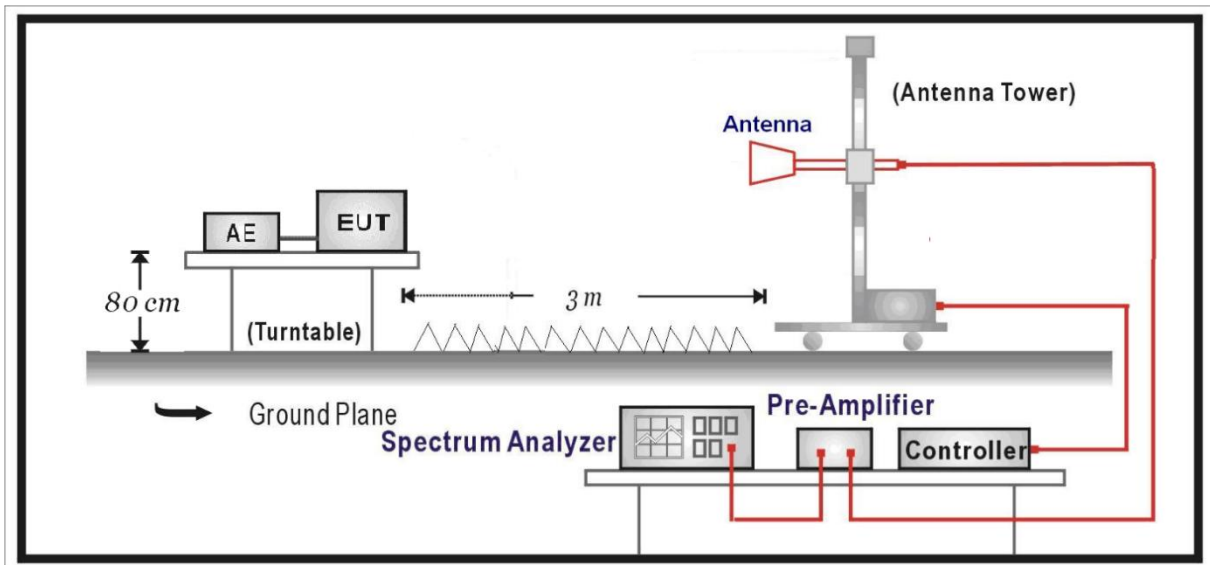
- 1) The radiated emissions were tested in a fully Anechoic Chamber.
- 2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the 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.

3.1.3 Test Setup

Below 1GHz Test Setup:



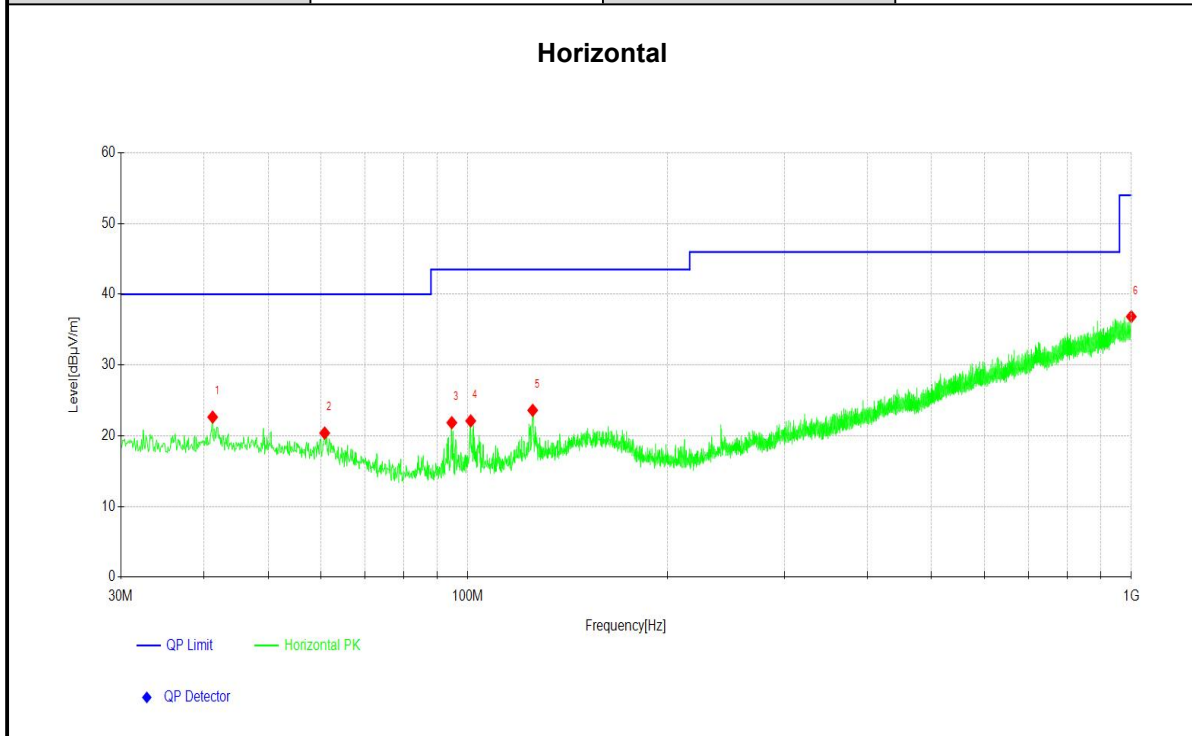
Above 1GHz Test Setup:





3.1.4 Test Results (Below 1GHz)

Test Mode	See section 2.4	Frequency Range	30-1000MHz
Test Voltage	See section 2.4	Detector Function	Quasi-Peak(QP)
Environmental Conditions	25.5deg. C,55% RH	Tested By	Li Yueao

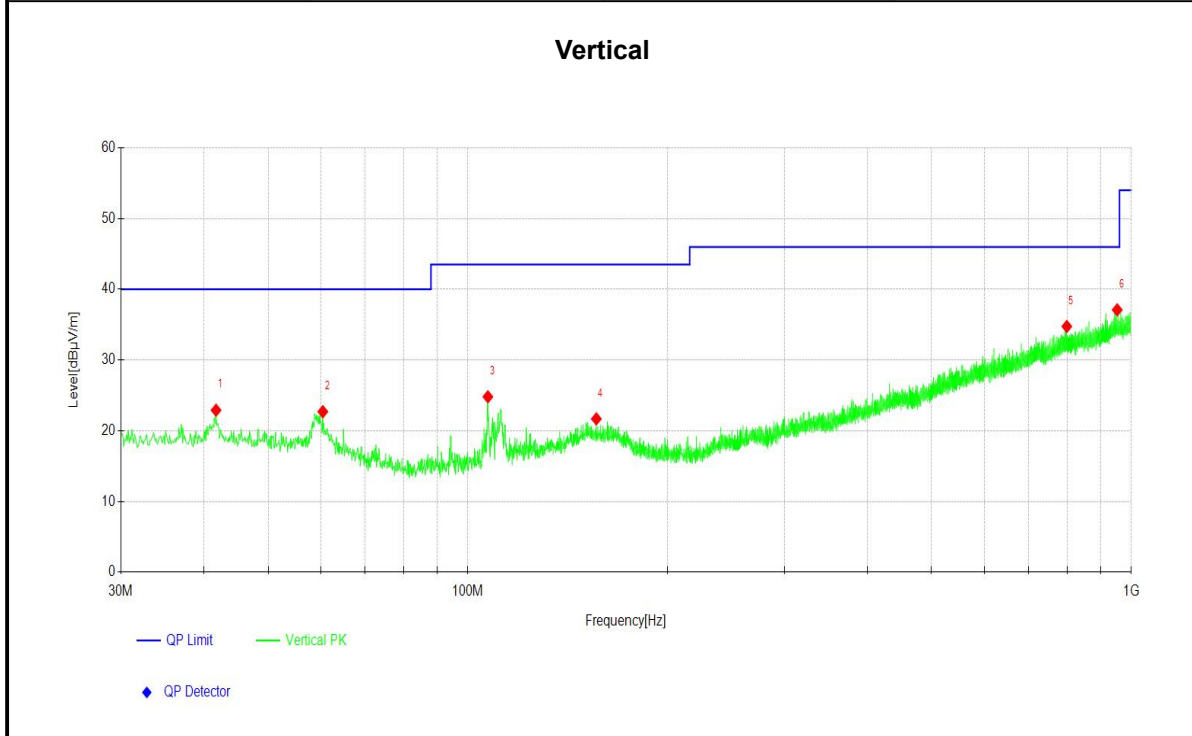


NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]
1	41.2531	3.88	18.75	22.63	40.00	17.37	200	268
2	60.8491	2.79	17.59	20.38	40.00	19.62	300	156
3	94.6085	7.14	14.71	21.85	43.50	21.65	300	3
4	101.0111	7.05	15.05	22.10	43.50	21.40	300	296
5	125.2635	6.53	17.07	23.60	43.50	19.90	200	57
6	999.903	4.40	32.45	36.85	54.00	17.15	200	340

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



Test Mode	See section 2.4	Frequency Range	30-1000MHz
Test Voltage	See section 2.4	Detector Function	Quasi-Peak(QP)
Environmental Conditions	25.5deg. C,55% RH	Tested By	Li Yueao



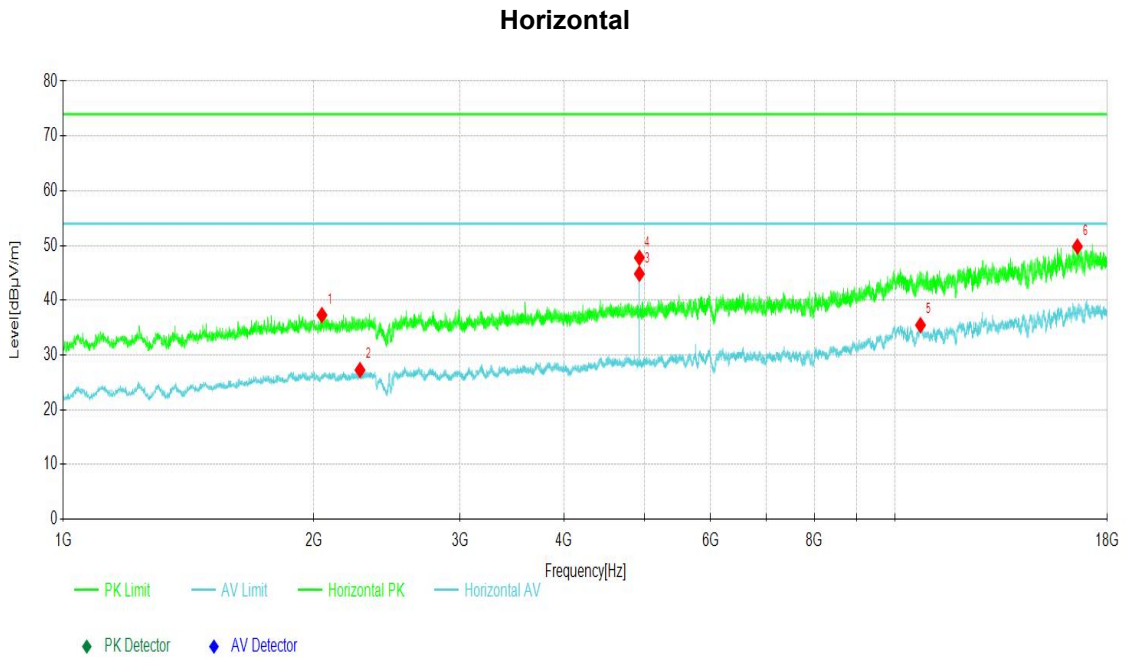
NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]
1	41.7382	4.13	18.78	22.91	40.00	17.09	300	180
2	60.461	5.05	17.65	22.70	40.00	17.30	100	267
3	107.2197	9.22	15.58	24.80	43.50	18.70	300	218
4	156.2096	2.43	19.25	21.68	43.50	21.82	100	138
5	799.4809	4.42	30.33	34.75	46.00	11.25	100	127
6	952.2712	4.68	32.42	37.10	46.00	8.90	100	215

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



3.1.5 Test Results (Above 1GHz)

Test Mode	See section 2.4	Frequency Range	Above 1GHz
Test Voltage	See section 2.4	Detector Function	PK/AV
Environmental Conditions	25.5deg. C,55% RH	Tested By	Li Yueao

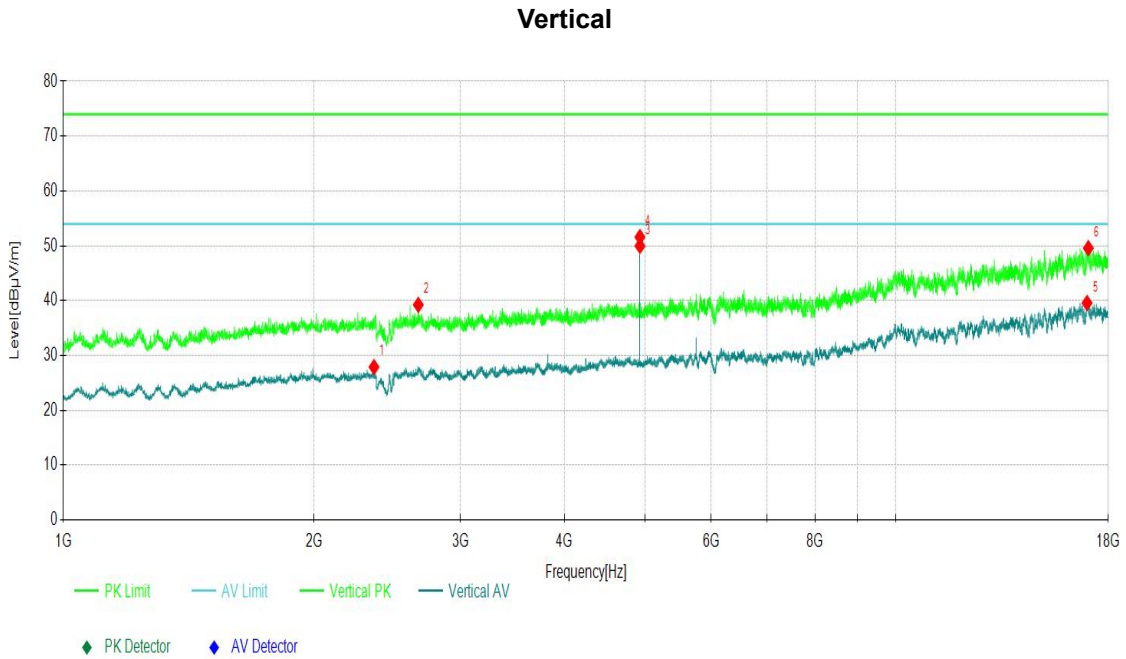


NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	2046.5047	51.21	-13.91	37.30	74.00	36.70	300	176	PK
2	2273.9274	41.84	-14.58	27.26	54.00	26.74	300	205	AV
3	4927.9928	54.65	-9.81	44.84	54.00	9.16	100	29	AV
4	4927.9928	57.59	-9.81	47.78	74.00	26.22	100	29	PK
5	10729.3729	36.26	-0.79	35.47	54.00	18.53	100	356	AV
6	16567.6568	43.88	5.94	49.82	74.00	24.18	300	277	PK

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



Test Mode	See section 2.4	Frequency Range	Above 1GHz
Test Voltage	See section 2.4	Detector Function	PK/AV
Environmental Conditions	25.5deg. C,55% RH	Tested By	Li Yueao



NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector
1	2361.5362	42.40	-14.49	27.91	54.00	26.09	300	330	AV
2	2669.3669	53.23	-13.98	39.25	74.00	34.75	300	272	PK
3	4927.9928	59.80	-9.81	49.99	54.00	4.01	100	80	AV
4	4927.9928	61.42	-9.81	51.61	74.00	22.39	100	80	PK
5	16972.4973	32.91	6.68	39.59	54.00	14.41	200	333	AV
6	17033.0033	43.16	6.43	49.59	74.00	24.41	100	122	PK

Remark: 1. Above 18GHz have been test and test data more than 20dB margin.
 2. Level (dBuV/m) = Reading (dBuV) + Factor (dB/m).
 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

Please refer to the attached file (Test Photos).



5. PHOTOGRAPHS OF THE EUT

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

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



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.

Laboratory: 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