



Test Report No.:
FCC2023-0054-EMC

EMC Test Report

EUT : **MaxRanger4K™ Solar Wireless Security Camera**
MODEL : **NVW-MR4KCAM**
BRAND NAME : **Swann**
APPLICANT : **Swann Communications U.S.A. Inc**
Classification of Test : **N/A**

CVC Testing Technology Co., Ltd.



CVC Testing Technology Co., Ltd.

Test Report No.: FCC2023-0054-EMC

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Applicant		Name : Swann Communications U.S.A. Inc Address : 12636 Clark Street Santa Fe Springs California United States 90670	
Manufacturer		Name : Shenzhen Infinova Limited Address : Infinova Building, Guan Lan High Tech Park, Huan Guan Road South. Longhua New District , Shenzhen Guangdong	
Equipment Under Test		Name :MaxRanger4K™ Solar Wireless Security Camera Model/Type: NVW-MR4KCAM Additional Model: N/A Trade mark : Swann Serial NO.:N/A Sample NO.4-1	
Date of Receipt.	2023.08.25	Date of Testing	2023.08.25~2023.10.12
Test Specification		Test Result	
FCC Part 15, Subpart B, Class B		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: 2023.10.16		
Tested by:  Lu Wei Ji Name Signature	Tested 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
FCC2023-0054-EMC	Original release	2023.10.16



1. SUMMARY OF TEST RESULTS

EMISSION			
Standard	Test Item	Result	Remarks
FCC Part 15, Subpart B, Class B	Conducted test	PASS	Minimum passing margin is 7.0 dB at 0.636MHz
	Radiated Test (30MHz~ 1GHz)	PASS	Minimum passing margin is 10.03dB at 559.964MHz
	Radiated Test (Above 1GHz)	PASS	Minimum passing margin is 3.68dB at 2459.945995MHz



1.1 LIST OF TEST AND MEASUREMENT INSTRUMENTS

Test Equipment	Type/Mode	SERIAL NO.	Equipment No.	Manufacturer	Cal. Due
Radiation emission					/
EMI Test Receiver	N9038A-508	MY532290079	EM-000397	Agilent	2024-02-22
EMI Test Receiver	ESR7	102235	VG DY-0956	R&S	2024-02-22
EMI Test Receiver	N9038A-508	MY53290078	EM-000396	Agilent	2023-12-06
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	2024-06-10
Loop Antenna	FMZB1513	1513-170	EM-000384	SCHWARZBECK	2024-02-24
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	2024-06-10
EMI Test Receiver	ESR3	102394	VG DY-0705	R&S	2024-02-22
LISN	NSLK 8127	8127644	VG DY-0150	SCHWARZBECK	2024-07-27
LISN	NSLK 8128	8128-316	VG DY-0149	SCHWARZBECK	2024-07-27
DC LISN	PVDC8301-017	PVDC8301#17	VG DY-0692	SCHWARZBECK	2024-09-27
LISN	NSLK 8129	8129-268	EM-000388	SCHWARZBECK	2024-02-22
Plus Limiter (#1)	VTSD 9561 F-N	00515	VG DY-0808	SCHWARZBECK	2024-03-03
Plus Limiter (#2)	VTSD 9561	9561-F017	VG DY-0152	SCHWARZBECK	2024-09-03
Impedance Stabilization Network	ISN T800	27095	WKNE-0195	TESEQ	2024-07-27
Impedance Stabilization Network	NTFM8158	8158-0092	VG DY-0356	SCHWARZBECK	2024-05-29
Impedance Stabilization Network	NTFM8131	#184	EM-000498	SCHWARZBECK	2024-05-29
Voltage Probe	TK9420	9420-499	VG DY-0128	SCHWARZBECK	2024-02-22
Power Divider	4901.17.B	22643830	DB-0016	HUBER+SUHNER	2024-07-17
Audio Signal Generator	GAG-810	EK871591	EM-000309	GW	2023-12-06
Shielding Room(#1)	GP1A	001	WKNF-0001	LEINING	2024-08-07

1. The calibration interval of the above Shielding room, Anechoic chamber and Control room is 36 months
2. The calibration interval of the above test instruments is 12 months



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	FREQUENCY	UNCERTAINTY
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

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: 0755-23763060-8805
Fax: 0755-23763060 E-mail: sz-kf@cvc.org.cn
<http://www.cvc.org.cn>



2. GENERAL INFORMATION

2.1 GENERAL PRODUCT INFORMATION

PRODUCT	MaxRanger4K™ Solar Wireless Security Camera
BRAND	Swann
MODEL	NVW-MR4KCAM
ADDITIONAL MODEL	N/A
POWER SUPPLY	DC 3.6V from Li-ion battery or DC 5V from USB host unit
OPERATING FREQUENCY	903.5MHz~926.5MHz for WiFi HaLow
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB line, 1Meter, Shielded without ferrite
Remark: <ol style="list-style-type: none">For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.EUT photo refer to the report (Report NO.: FCC2023-0054-E).	



2.2 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	Charging + Adapter + Light + Alarm + Camera	DC 5V from USB Host unit
For Radiated Emission Tests		
	Test Mode	Test Voltage
1	Charging + Adapter + Light + Alarm + Camera	DC 5V from USB Host unit
2	Light + Alarm + Camera	DC 3.6V from battery



2.3 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
ANSI C63.4:2014

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

2.4 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	Network bridge	N/A	N/A	19490	Client		
Support Cable							
NO	Description	Quantity (Number)	Length (m)	Detachable (Yes/ No)	Shielded (Yes/ No)	Cores (Number)	Supplied by
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

3. EMISSION

3.1 CONDUCTED EMISSION

3.1.1 Limits Of Conducted Emission

TEST STANDARD: FCC Part 15, Subpart B (Section: 15.107) and ICES-003 (Class A: section 6.1)

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.

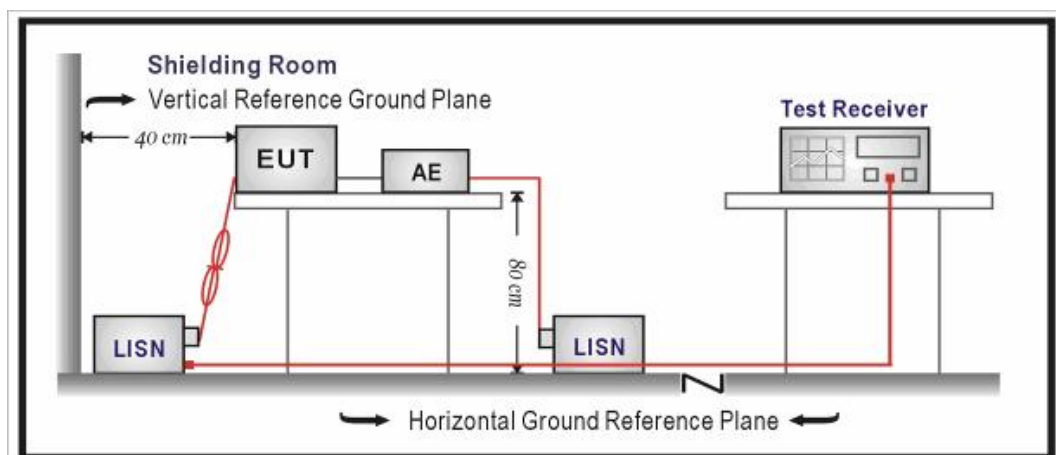
3.1.2 Test Procedures

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

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

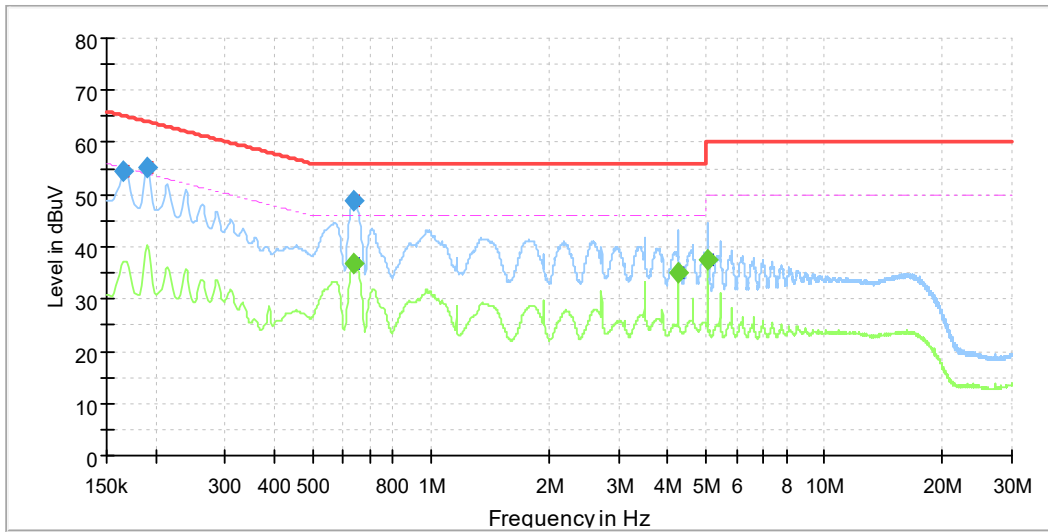




3.1.4 Test Results

CONDUCTED WORST-CASE DATA:

Test Mode	See section 2.2	Frequency Range	150KHz ~ 30MHz
Test Voltage	See section 2.2	PHASE	Line (L)
Environmental Conditions	26deg. C,51% RH	Tested By	Li Jialing

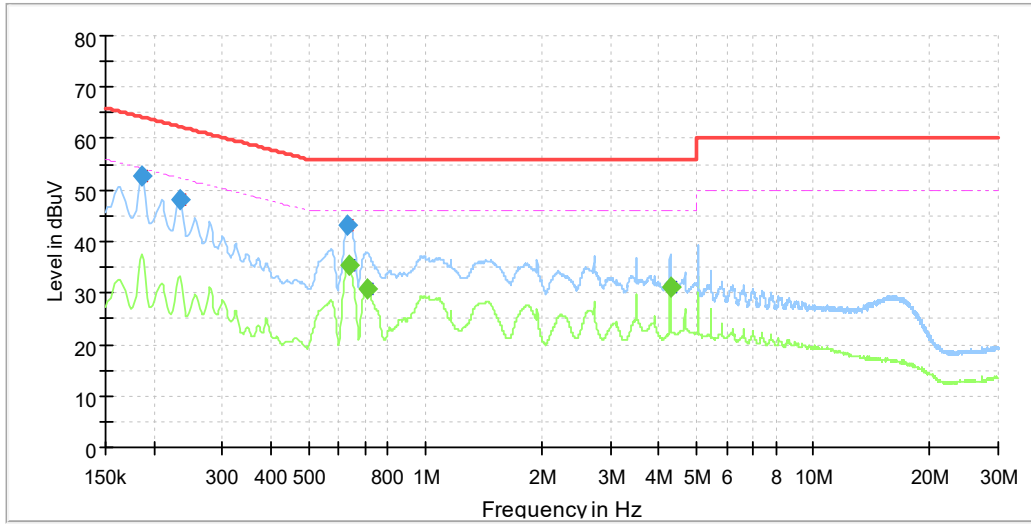


NO	Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr.Factor (dB)
1	0.166	54.7	---	65.2	10.5	L1	20.4
2	0.191	55.1	---	64.0	8.9	L1	20.4
3	0.636	49.0	---	56.0	7.0	L1	20.7
4	0.636	---	36.9	46.0	9.1	L1	20.7
5	4.268	---	35.1	46.0	10.9	L1	20.7
6	5.044	---	37.5	50.0	12.5	L1	20.6

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



Test Mode	See section 2.2	Frequency Range	150KHz ~ 30MHz
Test Voltage	See section 2.2	PHASE	Line (N)
Environmental Conditions	26deg. C,51% RH	Tested By	Li Jialing



NO	Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr.Factor (dB)
1	0.186	52.6	---	64.2	11.6	N	20.5
2	0.233	48.1	---	62.3	14.3	N	20.5
3	0.632	43.2	---	56.0	12.8	N	20.6
4	0.634	---	35.2	46.0	10.8	N	20.6
5	0.708	---	30.7	46.0	15.3	N	20.6
6	4.279	---	31.1	46.0	14.9	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

TEST STANDARD:

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

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:

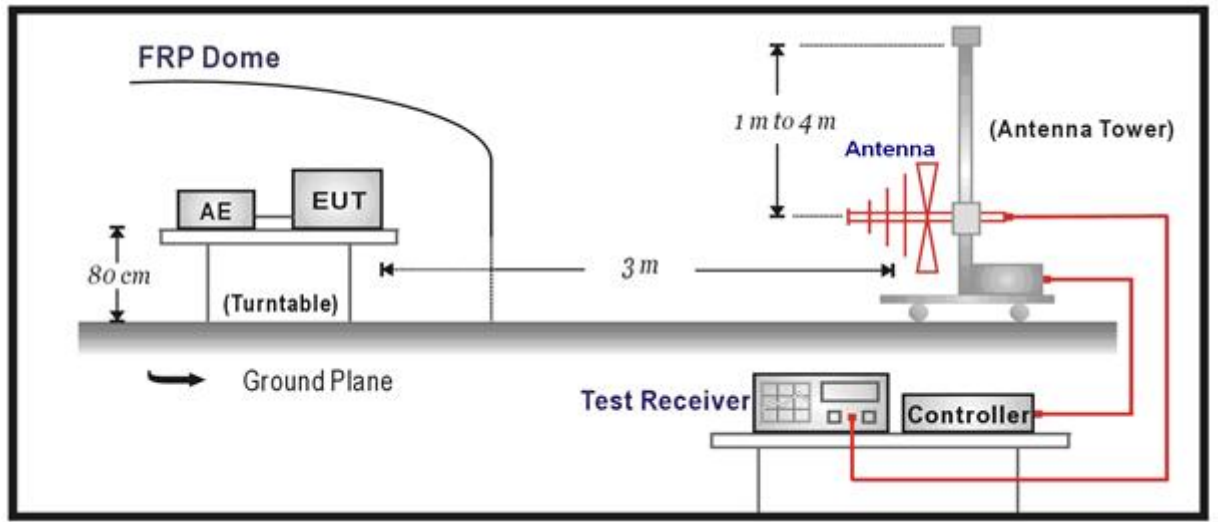
- 1) The radiated emissions were tested in a semi-anechoic chamber.
- 2) The Product was placed on the non-conductive turntable 0.1 m above the ground at a chamber.
- 3) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan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

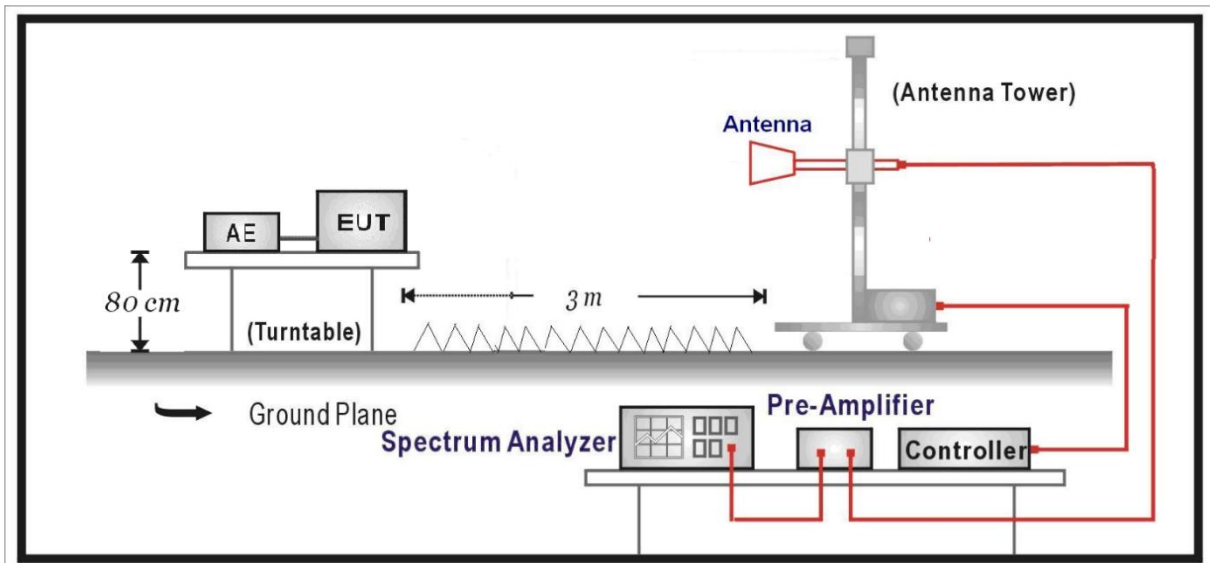
- 1) The radiated emissions were tested in a fully Anechoic Chamber.
- 2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the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



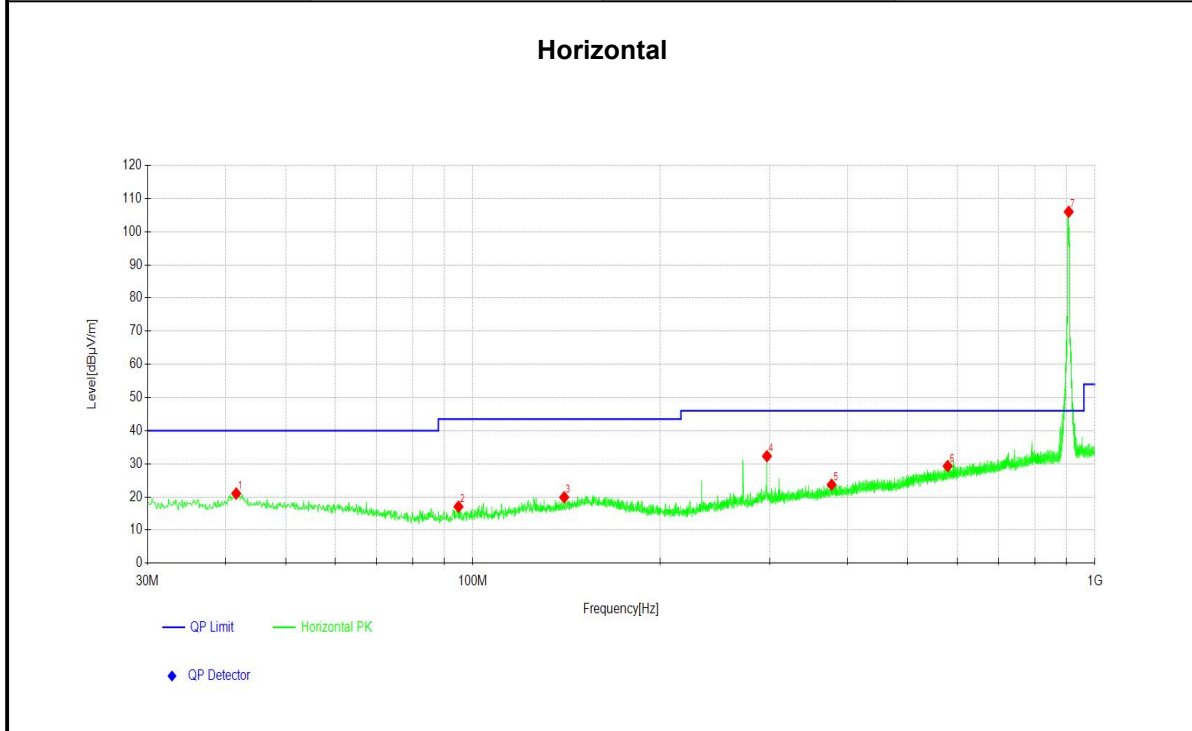
Above 1GHz Test Setup:





3.2.4 Test Results (Below 1GHz)

Test Mode:	See section 2.2	Frequency Range	30-1000MHz
Test Voltage	See section 2.2	Detector Function	Quasi-Peak(QP)
Environmental Conditions	24.2deg. C,57% RH	Tested By	Li Jialing



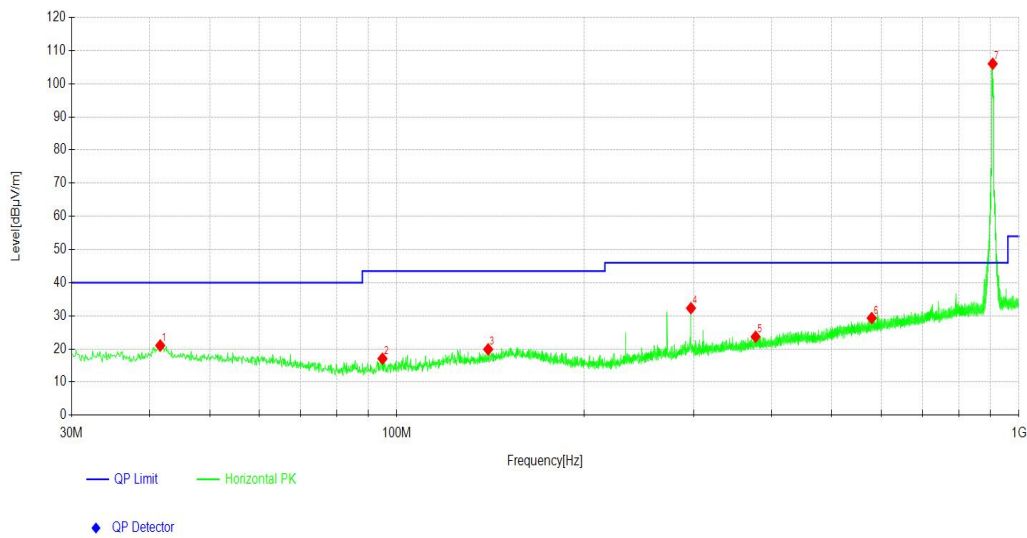
NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]
1	41.641	2.25	18.78	21.03	40.00	18.97	100	253
2	94.802	2.34	14.72	17.06	43.50	26.44	100	109
3	140.203	1.93	17.96	19.89	43.50	23.61	100	42
4	296.971	13.22	19.09	32.31	46.00	13.69	100	52
5	377.295	2.47	21.22	23.69	46.00	22.31	100	209
6	579.754	3.46	25.85	29.31	46.00	16.69	100	288
#7	907.356	74.80	31.23	106.03			100	242

Remark: 1. The emission levels of other frequencies were greater 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]
 5. # mean fundamental frequency.



Test Mode:	See section 2.2	Frequency Range	30-1000MHz
Test Voltage	See section 2.2	Detector Function	Quasi-Peak(QP)
Environmental Conditions	24.2deg. C,57% RH	Tested By	Li Jialing

Vertical



NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]
1	36.209	9.02	18.44	27.46	40.00	12.54	100	314
2	80.930	8.37	14.37	22.74	40.00	17.26	100	314
3	148.255	0.86	19.15	20.01	43.50	23.49	100	154
4	296.971	5.60	19.09	24.69	46.00	21.31	100	259
5	429.389	2.26	22.96	25.22	46.00	20.78	100	158
6	559.964	10.37	25.60	35.97	46.00	10.03	100	85
#7	907.259	79.59	31.23	110.82			100	111

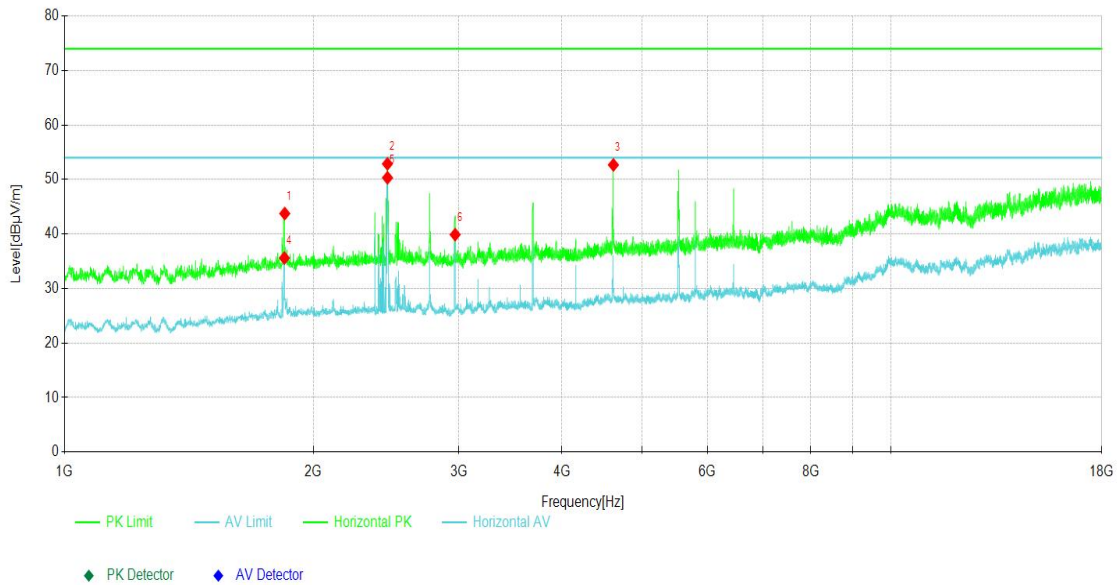
Remark: 1. The emission levels of other frequencies were greater than 20dB margin.
 2. Level (dBµV/m) = Reading (dBµV) + Factor (dB/m).
 3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 4. Margin(dB) = Limit[dBµV/m] - Level [dBµV/m]
 5. # mean fundamental frequency.



3.2.5 Test Results (Above 1GHz)

Test Mode:	See section 2.2	Frequency Range	Above 1GHz
Test Voltage	See section 2.2	Detector Function	PK/AV
Environmental Conditions	22.7deg. C,50% RH	Tested By	Li Jialing

Horizontal



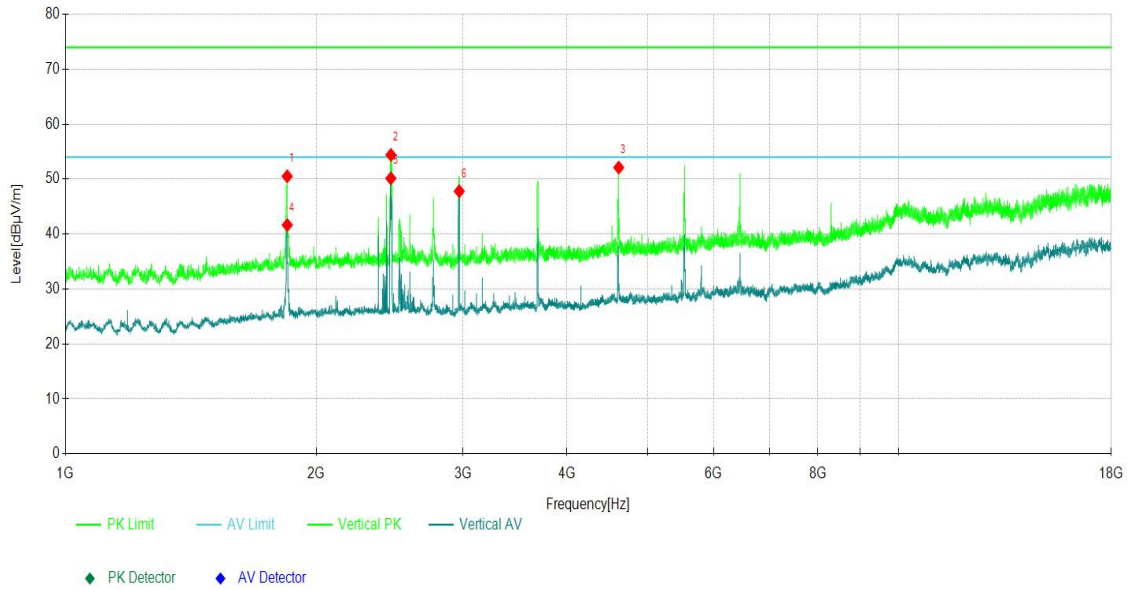
NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	1847.284728	58.05	-14.29	43.76	74.00	30.24	200	42	PK
2	2459.345935	67.28	-14.41	52.87	74.00	21.13	200	203	PK
3	4615.961596	62.97	-10.29	52.68	74.00	21.32	200	315	PK
4	1845.484548	49.94	-14.33	35.61	54.00	18.39	200	47	AV
5	2459.945995	64.73	-14.41	50.32	54.00	3.68	200	203	AV
6	2969.997	53.86	-13.97	39.89	54.00	14.11	200	339	AV

Remark: 1. The emission levels of other frequencies were greater 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]



Test Mode:	See section 2.2	Frequency Range	Above 1GHz
Test Voltage	See section 2.2	Detector Function	PK/AV
Environmental Conditions	22.7deg. C,50% RH	Tested By	Li Jialing

Vertical



NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	1846.084608	64.83	-14.31	50.52	74.00	23.48	200	343	PK
2	2458.745875	68.82	-14.41	54.41	74.00	19.59	200	203	PK
3	4614.761476	62.41	-10.30	52.11	74.00	21.89	100	309	PK
4	1846.084608	55.97	-14.31	41.66	54.00	12.34	200	0	AV
5	2458.145815	64.56	-14.41	50.15	54.00	3.85	100	270	AV
6	2969.997	61.78	-13.97	47.81	54.00	6.19	100	79	AV

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]



4. PHOTOGRAPHS OF TEST SETUP

Please refer to the attached file (Test Setup Photo).



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.

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Tel: 020-32293888

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E-mail: office@cvc.org.cn