



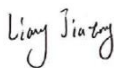
Test Report No.:
FCCSZ2023-0011-E

RF Test Report

EUT : Smart PDM assembly
MODEL : 10-8231
BRAND NAME : N/A
APPLICANT : THERMASOL STEAMBATH CO.
Classification of Test : N/A

CVC Testing Technology (Shenzhen) Co., Ltd.



Applicant		Name: THERMASOL STEAMBATH CO. Address: 1958 STEAM WAY ROUND ROCK, TX 78665 USA	
Manufacturer		Name: Chengdu Vantron Technology Co., Ltd. Address: No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China	
Equipment Under Test		Product Name: Smart PDM assembly Model/Type: 10-8231 Brand Name: N/A Serial NO.: N/A Sample NO.: 2-1	
Date of Receipt.	2023.10.16	Date of Testing	2023.10.16~2023.11.02
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: 2023.10.06		
Tested by:  <u>Liang Jiatong</u> Name Signature	Tested by:  <u>Huang Meng</u> Name Signature	Approved by:  <u>Dong Sanbi</u> 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
FCCSZ2023-0011-E	Original release	2023.11.06



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 10.0dB at 0.290 MHz
	Radiated Test (30MHz~ 1GHz)	PASS	Minimum passing margin is 2.97dB at 204.75MHz
	Radiated Test (Above 1GHz)	PASS	Minimum passing margin is 12.05dB at 2019.60196MHz



1.1 LIST OF TEST AND MEASUREMENT INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial Number	Cal. interval	Cal. Due
Radiation Spurious					/
EMI Test Receiver	Rohde&Schwarz	ESR 26	101718	1 year	2024.5.25
Loop antenna (8.3k~30MHz)	Rohde&Schwarz	HFH2-Z2E	100951	1 year	2024.5.26
Antenna(30MHz~1000MHz)	SCHWARZBECK	VULB 9168	1132	1 year	2024.2.14
Horn antenna(1GHz-18GHz)	ETS	3117	227634	1 year	2024.3.25
Horn antenna(18GHz-40GHz)	SCHWARZBECK	BBHA 9170	01003	1 year	2024.3.25
3m anechoic chamber	MORI	966	CS0200019	3 year	2026.5.18
Attenuator	/	SJ-5dB	607684	1 year	2024.2.21
#1 control room	MORI	433	CS0300028	3 year	2026.5.16
Temperature and humidity meter	/	C193561473	CS0200071	1 year	2024.5.21
Conducted emission					/
EMI Test Receiver	Rohde&Schwarz	ESR3	102694	1 year	2024.5.25
limiter (10 dB)	Rohde&Schwarz	ESH3-Z2	102824	1 year	2024.5.16
Voltage probe	Rohde&Schwarz	CVP9222C	28	1 year	2024.5.16
Current probe	Rohde&Schwarz	EZ-17	101442	1 year	2024.5.21
ISN network	Rohde&Schwarz	ENV 81	100401	1 year	2024.5.16
ISN network	Rohde&Schwarz	ENV 81 Cat6	101896	1 year	2024.5.16
LISN (single-phase)	Rohde&Schwarz	ENV216	102569	1 year	2024.4.11
#1Shielding room	MORI	854	N/A	3 year	2026.5.16



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
1	Conducted emission test	+/-2.70 dB
2	Radiated emission 30MHz-1GHz	+/-4.6 dB
3	Radiated emission 1GHz-18GHz	+/-4.4 dB
4	Radiated emission 18GHz-40GHz	+/-5.1 dB
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 (Shenzhen) Co., Ltd.

Lab Address: No. 1301, Guanguang Road, Xinlan Community, Guanlan Street, Longhua District, Shenzhen City, Guangdong Province 518110 P.R.China

Post Code: 518110 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	Smart PDM assembly
BRAND	N/A
TEST MODEL	10-8231
ADDITIONAL MODEL	N/A
POWER SUPPLY	DC 24V host unit
OPERATING FREQUENCY	Above 108MHz
I/O PORTS	refer to the 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.	

2.2 DESCRIPTION OF ACCESSORIES

Accessories Equipment							
NO	Description	Brand	Model No.	Serial Number	Supplied by		
1	Adapter	MW	OWA-60U-24	CC37274540	Client		
Accessories Cable							
NO	Description	Quantity (Number)	Length (m)	Detachable (Yes/ No)	Shielded (Yes/ No)	Cores (Number)	Supplied by
1	HMDI+USB	N/A	N/A	yes	yes	N/A	Client



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 Test		
Test Mode		Test Voltage
1	HDMI+RJ45+Earphone+USB	DC 24V form adapter
For Radiated Emission Test		
Test Mode		Test Voltage
1	HDMI+RJ45+Earphone+USB	DC 24V form adapter

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
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.

During the tests:

Support Equipment							
NO	Description	Brand	Model No.	Serial Number	Supplied by		
1	Laptop	Lenovo	V14	PFNXB1628023	Lab		
2	10' display assembly	N/A	10-8229	N/A	Client		
Support Cable							
NO	Description	Quantity (Number)	Length (m)	Detachable (Yes/ No)	Shielded (Yes/ No)	Cores (Number)	Supplied by
N/A	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)

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.

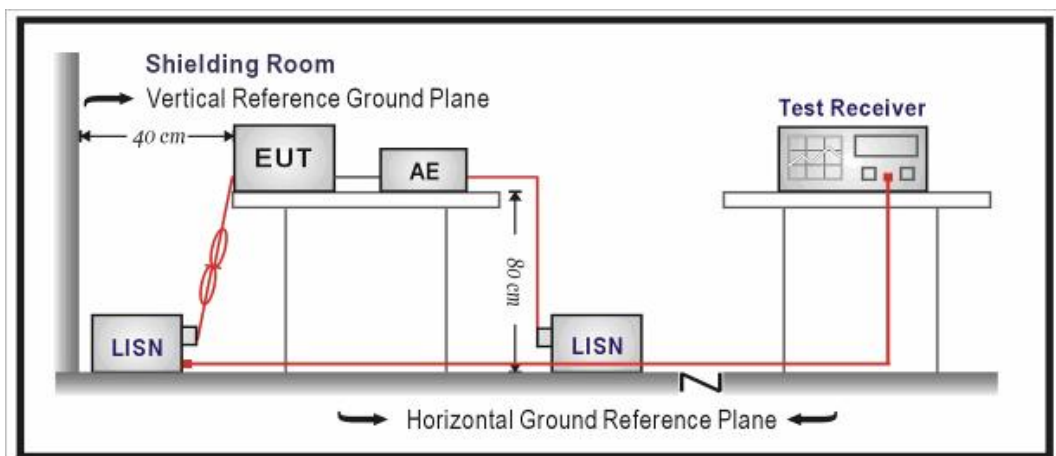
3.1.2 Test Procedures

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.

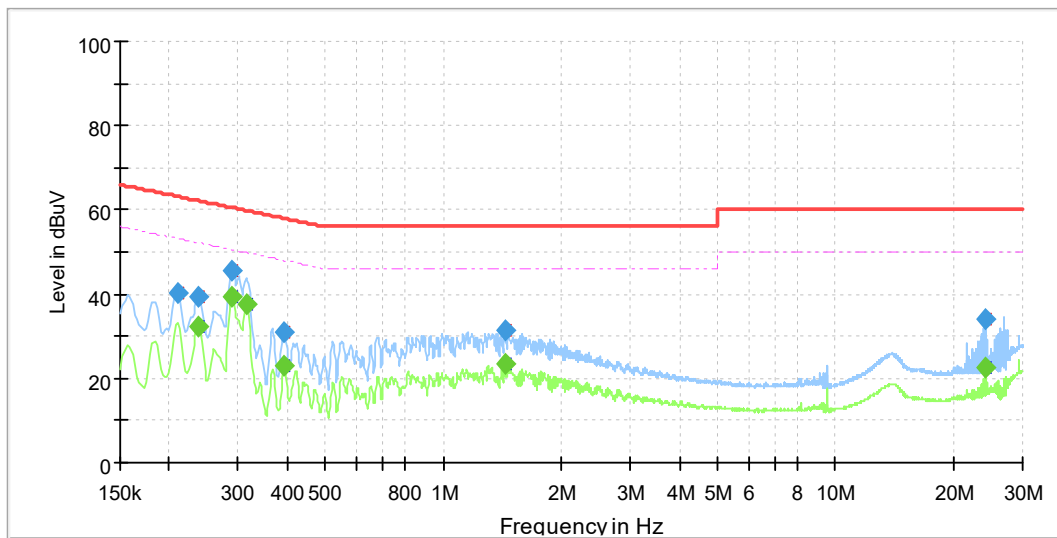
3.1.3 Test setup





3.1.4 Test Results

Test Mode	See section 2.3	Frequency Range	150KHz ~ 30MHz
Test Voltage	See section 2.3	PHASE	Line (L)
Environmental Conditions	24.6deg. C, 46% RH	Tested By	Wang Zhiming

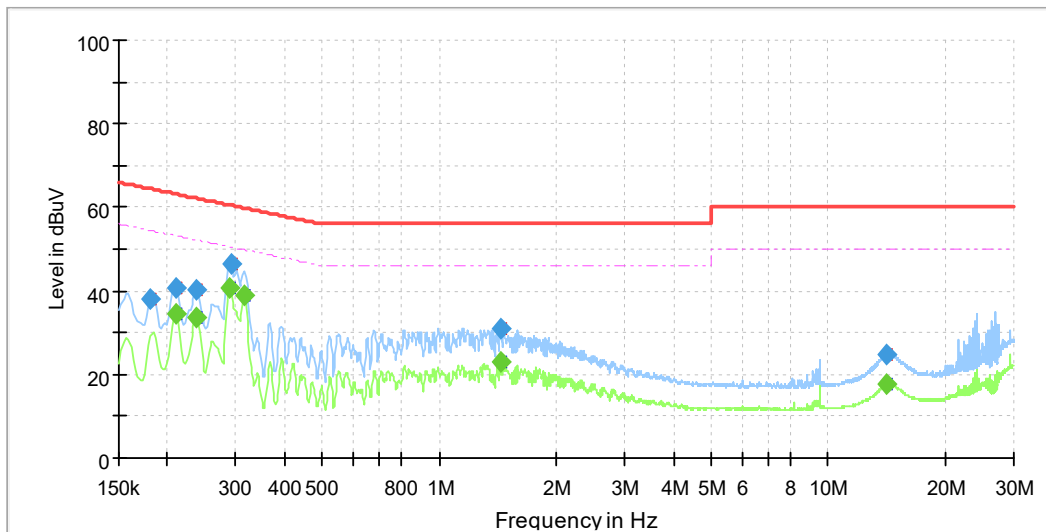


NO.	Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
1	0.211	40.2	---	63.2	23.0	L1	19.4
2	0.238	39.2	---	62.2	22.9	L1	19.4
3	0.238	---	32.4	52.2	19.8	L1	19.4
4	0.290	45.7	---	60.5	14.8	L1	19.4
5	0.290	---	39.4	50.5	11.1	L1	19.4
6	0.317	---	37.7	49.8	12.1	L1	19.4
7	0.391	30.9	---	58.0	27.2	L1	19.4
8	0.393	---	23.0	48.0	25.0	L1	19.4
9	1.435	---	23.3	46.0	22.7	L1	19.5
10	1.437	31.4	---	56.0	24.6	L1	19.5
11	24.000	---	22.4	50.0	27.6	L1	19.9
12	24.000	34.1	---	60.0	25.9	L1	19.9

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	24.6deg. C, 46% RH	Tested By	Wang Zhiming



NO.	Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
1	0.182	38.1	---	64.4	26.3	N	19.5
2	0.211	40.7	---	63.2	22.5	N	19.5
3	0.211	---	34.5	53.2	18.7	N	19.5
4	0.238	40.2	---	62.2	22.0	N	19.4
5	0.238	---	33.6	52.2	18.6	N	19.4
6	0.290	---	40.5	50.5	10.0	N	19.4
7	0.292	46.5	---	60.5	13.9	N	19.4
8	0.317	---	38.8	49.8	11.0	N	19.4
9	1.435	31.1	---	56.0	24.9	N	19.5
10	1.435	---	23.1	46.0	22.9	N	19.5
11	14.044	24.8	---	60.0	35.2	N	20.1
12	14.177	---	17.9	50.0	32.1	N	20.1

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)

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:

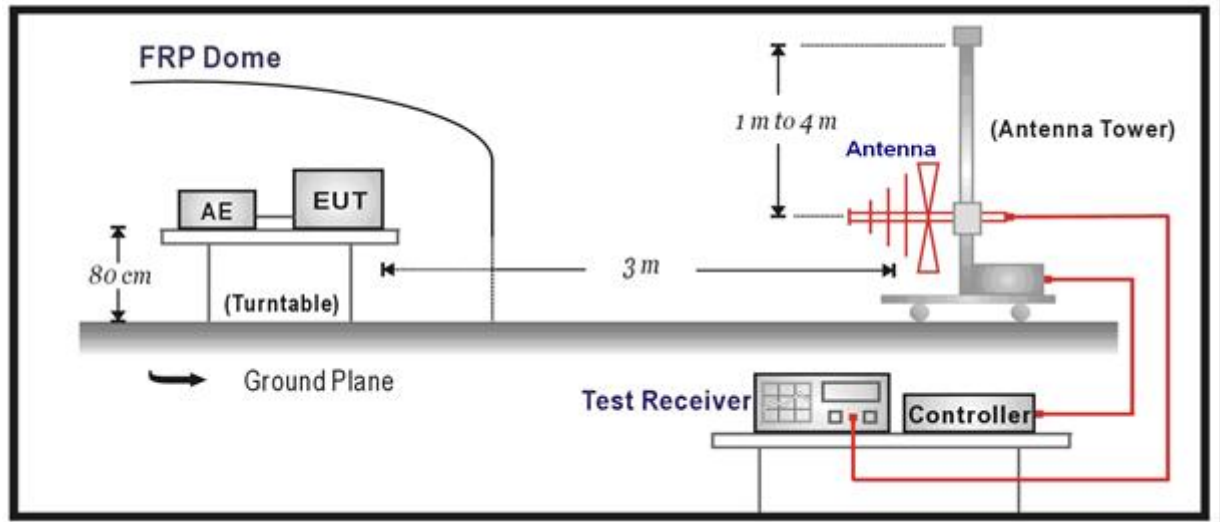
- 1) The radiated emissions were tested in a semi-anechoic chamber.
- 2) The Product was placed on the non-conductive turntable 0.1 m above the ground at a chamber.
- 3) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan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

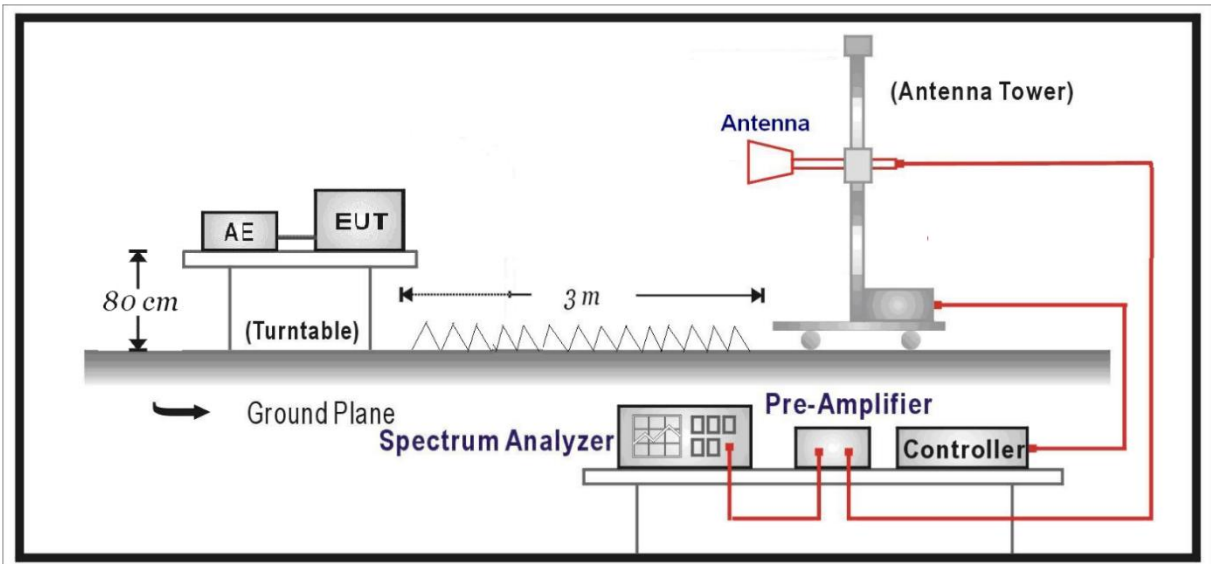
- 1) The radiated emissions were tested in a fully Anechoic Chamber.
- 2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the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



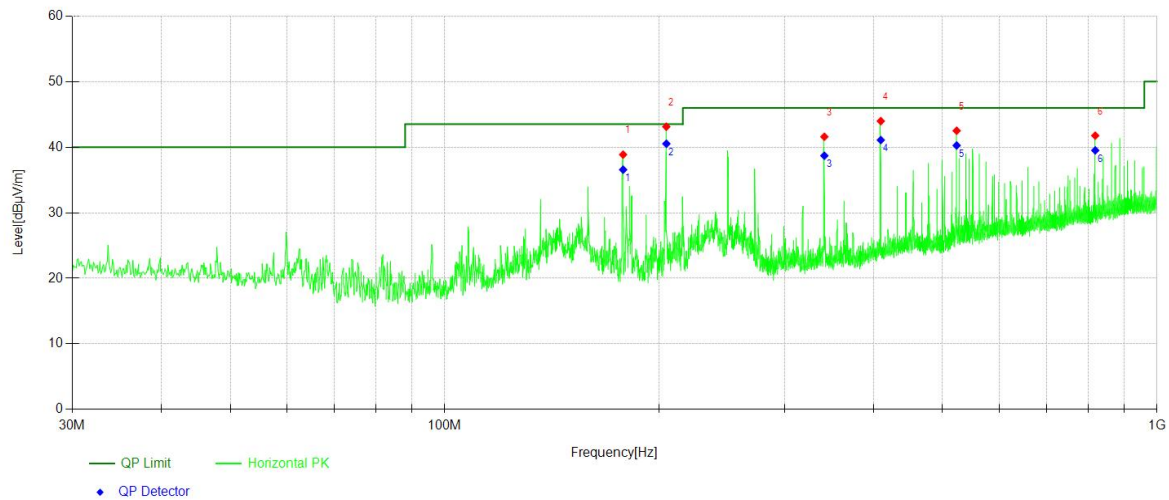
Above 1GHz Test Setup:





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	25deg. C,60% RH	Tested By	Wang Zhiming



Suspected Data List										
NO.	Freq. [MHz]	Reading [dBuV]	Factor [dB/m]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
1	178.03	17.39	19.18	36.57	43.50	6.93	100	152	QP	Horizontal
2	204.75	23.05	17.48	40.53	43.50	2.97	184.6	131	QP	Horizont
3	341.20	16.72	21.98	38.70	46.00	7.30	100	324	QP	Horizontal
4	409.50	17.89	23.20	41.09	46.00	4.91	100	253	QP	Horizontal
5	523.29	14.71	25.55	40.26	46.00	5.74	200	1	QP	Horizontal
6	819.07	9.46	30.05	39.51	46.00	6.49	100	152	QP	Horizontal

Remark:1. The emission levels of other frequencies were greater than 20dB margin.

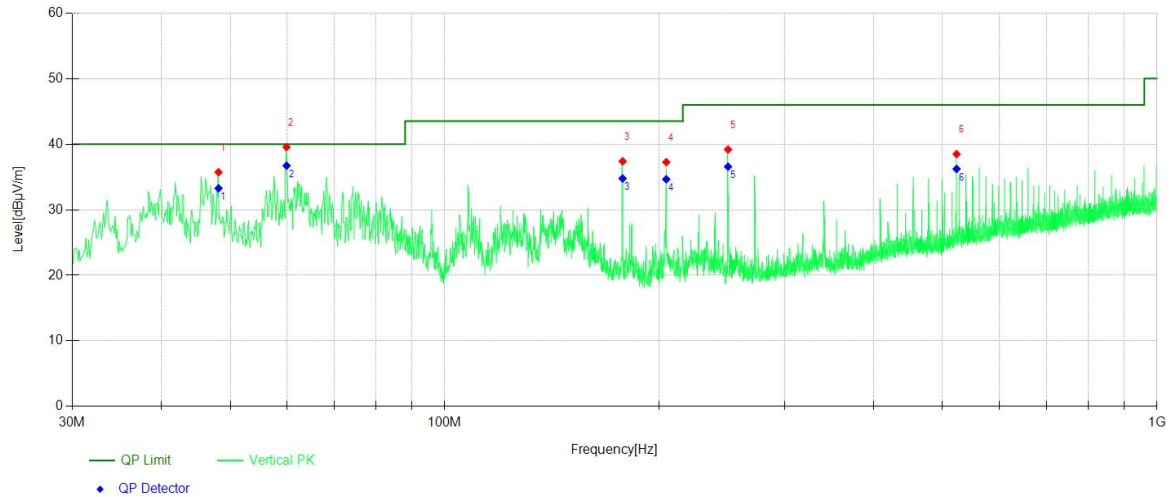
2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB).

3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).

4. Margin(dB) = Limit[dBuV/m] - Level [dBuV/m]



Test Mode:	See section 2.3	Frequency Range	30-1000MHz
Test Voltage	See section 2.3	Detector Function	Quasi-Peak(QP)
Environmental Conditions	25deg. C,60% RH	Tested By	Wang Zhiming



Suspected Data List										
NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
1	48.140	13.46	19.81	33.27	40.00	6.73	100	294	QP	Vertical
2	59.993	17.66	19.06	36.72	40.00	3.28	103.4	183	QP	Vertical
3	177.74	15.57	19.20	34.77	43.50	8.73	100	273	QP	Vertical
4	204.71	17.17	17.48	34.65	43.50	8.85	100	2	QP	Vertical
5	249.92	17.37	19.20	36.57	46.00	9.43	100	30	QP	Vertical
6	523.19	10.69	25.54	36.23	46.00	9.77	100	60	QP	Vertical

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			25deg. C,60% RH		Tested By		Wang Zhiming		
Horizontal									
NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	1009.50095	56.92	-19.19	37.73	74.00	36.27	200	276	PK
2	1544.054405	54.39	-17.1	37.29	74.00	36.71	200	237	PK
3	2019.60196	58.63	-13.64	44.99	74.00	29.01	100	307	PK
4	1009.50095	51.27	-19.19	32.08	54.00	21.92	100	281	AV
5	1306.530653	50.39	-18.44	31.95	54.00	22.05	100	300	AV
6	2019.60196	55.59	-13.64	41.95	54.00	12.05	100	314	AV
Vertical									
NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	1009.50095	57.18	-19.19	37.99	74.00	36.01	100	0	PK
2	1366.036604	57.33	-18.24	39.09	74.00	34.91	100	340	PK
3	2019.60196	52.89	-13.64	39.25	74.00	34.75	100	321	PK
4	1306.530653	52.08	-18.44	33.64	54.00	20.36	100	321	AV
5	1544.054405	46.53	-17.1	29.43	54.00	24.57	100	256	AV
6	2019.60196	47.5	-13.64	33.86	54.00	20.14	100	295	AV
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]									



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 report 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.

Address: No. 1301, Guanguang Road, Xinlan Community, Guanlan Street,
Longhua District, Shenzhen, Guangdong, 518110, P. R. China

Post Code: 518110 Tel: 0755-23763060-8805

Fax: 0755-23763060 E-mail: sz-kf@cvc.org.cn

<http://www.cvc.org.cn>