

SHEZHEN LIANCHUANG TECHNOLOGY GROUP CO., LTD.

TEST REPORT



SCOPE OF WORK

EMC TESTING—DF-HU28010U1

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TEST REPORT

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Intertek Report No: 170811077GZU-001

Test standards

47 CFR Part 18 [2016 Edition]

Sample Description

Product : Ultrasonic humidifier
Model No. : DF-HU28010U1
Operation frequency 1.7MHz
FCC ID 2AG3VDF-HU28010U1
Electrical Rating : 120Vac, 60Hz
Serial No. Not Labeled
Date Received : 11 August 2017
Date Test : 11 August 2017-18 October 2017
Conducted

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TEST REPORT

CONTENT

TEST REPORT	1
CONTENT	3
1. TEST RESULTS SUMMARY	4
2. EMC RESULTS CONCLUSION.....	5
3. LABORATORY MEASUREMENTS.....	6
4. EQUIPMENT USED DURING TEST	7
5. EMI TEST.....	8
5.1 FCC PART 18 CONTINUOUS CONDUCTED DISTURBANCE VOLTAGE TEST	8
5.1.1 <i>Block Diagram of Test Setup.....</i>	8
5.1.2 <i>Test Setup and Procedure</i>	8
5.1.3 <i>Limit</i>	9
5.1.4 <i>Test Data and curve.....</i>	10
5.2 FCC PART 18 RADIATED EMISSION 9 KHz TO 30 MHz	12
5.3 FCC PART 18 RADIATED EMISSION 30 MHz -1000 MHz	13
5.3.1 <i>Block Diagram of Test Setup.....</i>	13
5.3.2 <i>Test Setup and Procedure.....</i>	13
5.3.3 <i>Limit</i>	14
5.3.4 <i>Test Data and Curve</i>	15
6. APPENDIX I - PHOTOS OF TEST SETUP	17

TEST REPORT

1. TEST RESULTS SUMMARY

Test Item	Standard	Result
Conducted disturbance voltage at mains ports	FCC Part 18: 2016	Pass
Radiated Emission (9 kHz to 30 MHz)	FCC Part 18: 2016	N/A
Radiated Emission (30 MHz to 1 GHz)	FCC Part 18: 2016	Pass
Remark: Reference publication is used for methods of measurement: FCC OST/ MP-5:1986		

Remark:

1. The symbol "N/A" in above table means Not Applicable.
2. When determining the test results, measurement uncertainty of tests has been considered.

TEST REPORT

2. EMC RESULTS CONCLUSION

RE: EMC Testing Pursuant to FCC part 18 performed on the Ultrasonic humidifier,
Model: DF-HU28010U1.

We tested the Ultrasonic humidifier, Model: DF-HU28010U1, to determine if it was in compliance with the relevant standards as marked on the Test Results Summary. We found that the unit met the requirement of FCC part 18 standard when tested as received. The worst case's test data was presented in this test report.

The production units are required to conform to the initial sample as received when the units are placed on the market.

TEST REPORT

3. LABORATORY MEASUREMENTS

Configuration Information

Support Equipment: N/A

Rated Voltage and frequency under test: 120Vac, 60Hz
Condition of Environment: Temperature: 22~28°C
Relative Humidity: 35~60%
Atmosphere Pressure: 86~106kPa

Notes:

1. The EMI measurements had been made in the operating mode produced the largest emission in the frequency band being investigated consistent with normal applications. An attempt had been made to maximize the emission by varying the configuration of the EUT.

2. Test Facility accreditation:

A2LA Certificate Number 0078.10

Intertek Testing Services Shenzhen Ltd. Guangzhou Branch is accredited by A2LA and Listed in FCC website. FCC accredited test labs may perform both Certification testing under Parts 15 and 18 and Declaration of Conformity testing.

3. Test Location:

Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

All tests were performed at:

Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD Guangzhou, China

Except Radiated Emissions was performed at:

Room102/104, No 203, KeZhu Road, Science City, GETDD Guangzhou, China

4. Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Conduction Emission (9 kHz-150 kHz)	2.51 dB
2	Conduction Emission (150 kHz-30 MHz)	2.69 dB
3	Disturbance Power (30 MHz-300 MHz)	3.21 dB
4	Radiated Emission (30 MHz-1 GHz)	4.79 dB
5	Radiated Emission (1 GHz-6 GHz)	5.02 dB
6	Radiated Emission (6 GHz-18 GHz)	5.17 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

The measurement uncertainty is given with a confidence of 95%, k=2.

TEST REPORT

4. EQUIPMENT USED DURING TEST

Conducted Disturbance-Mains Terminal(1)

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (DD-MM-YYYY)	Calibration Interval
EM080-05	EMI receiver	ESCI	R&S	24/07/2018	1Y
EM006-05	LISN	ENV216	R&S	04/06/2018	1Y
SA047-79	Digital Temperature-Humidity Recorder	RC-HT601A	HATAIKE	07/06/2018	1Y
EM004-04	EMC shield Room	8m×3m×3m	Zhongyu	23/01/2018	1Y

Radiated Disturbance (30 MHz-1 GHz)

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (DD-MM-YYYY)	Calibration Interval
EM030-04	3m Semi-Anechoic Chamber	9×6×6 m3	ETS- LINDGREN	01/05/2018	1Y
EM031-02	EMI Test Receiver (9 kHz~7 GHz)	R&S ESR7	R&S	27/03/2018	1Y
EM033-01	TRILOG Super Broadband test Antenna (30 MHz-3 GHz)	VULB 9163	SCHWARZBE CK	19/09/2018	1Y
EM031-02-01	Coaxial cable	/	R&S	18/05/2018	1Y
SA047-118	Digital Temperature-Humidity Recorder	RS210	YIJIE	10/07/2018	1Y
EM045-01-01	EMC32 software (RE/RS)	V10.01.00	R&S	N/A	N/A

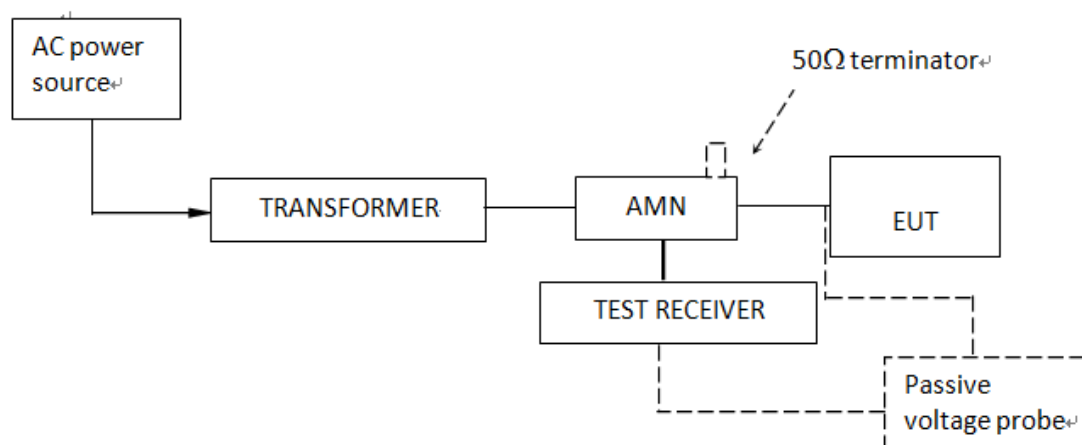
TEST REPORT

5. EMI TEST

5.1 FCC part 18 Continuous Conducted Disturbance Voltage Test

Test Result: Pass

5.1.1 Block Diagram of Test Setup



5.1.2 Test Setup and Procedure

The EUT was set to achieve the maximum emission level. The mains terminal disturbance voltage was measured with the EUT in a shielded room. The EUT was connected to AC power source through an Artificial Mains Network which provides a 50Ω linear impedance artificial hand is used if appropriate (for handheld apparatus).

The table-top EUT was placed on a 0.8m high non-metallic table above earthed ground plane (Ground Reference Plane). And for floor standing EUT, was placed on a 0.1m high non-metallic supported on GRP. The EUT keeps a distance of at least 0.4m from a vertical metallic surface. The Artificial Mains Network is situated at a distance of 0.8m from the EUT.

During the test, mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m.

The bandwidth of test receiver was set at 200 Hz for measurements from 9 kHz to 150 kHz and 9 kHz for measurements from 150 kHz to 30 MHz.

TEST REPORT

5.1.3 Limit

Frequency range MHz	AC mains terminals dB (uV)	
	Quasi-peak	Average
0.009 to 0.05	110	-
0.05 to 0.15	90 to 80*	-
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50
Note 1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.		
Note 2: The lower limit is applicable at the transition frequency.		

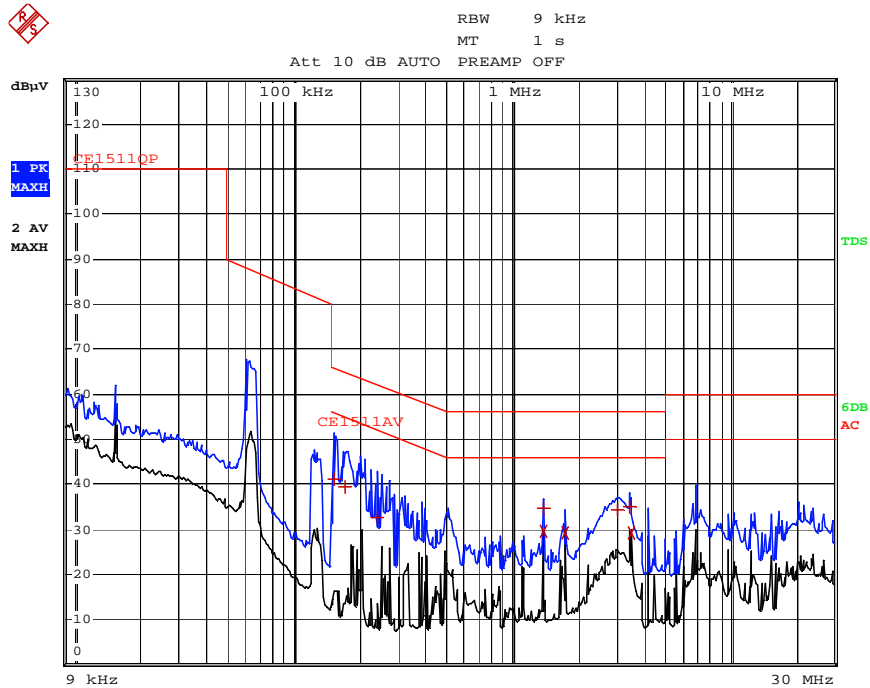
TEST REPORT

5.1.4 Test Data and curve

At mains terminal:

Tested Wire: Live

Operation Mode: EUT ON Continuously + heating mode (worst case)

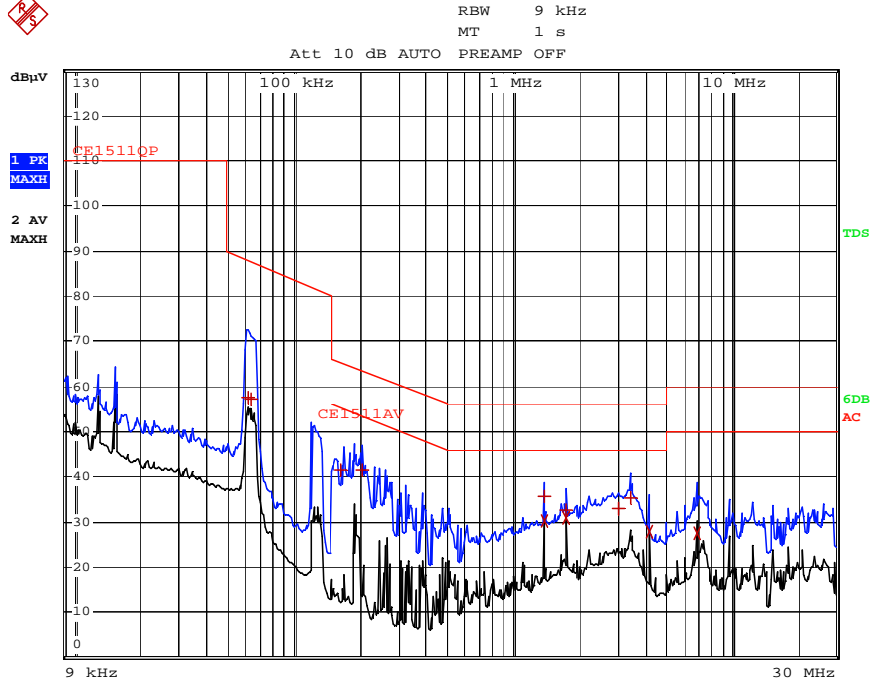


EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CE1511QP			
Trace2:	CE1511AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV		DELTA LIMIT dB
1 Quasi Peak	154 kHz	41.26 L1		-24.51
1 Quasi Peak	174 kHz	39.29 L1		-25.47
1 Quasi Peak	238 kHz	32.52 L1		-29.63
1 Quasi Peak	1.398 MHz	34.73 L1		-21.26
2 Average	1.398 MHz	29.64 L1		-16.35
2 Average	1.746 MHz	29.02 L1		-16.97
1 Quasi Peak	3.058 MHz	34.41 L1		-21.58
1 Quasi Peak	3.49 MHz	34.86 L1		-21.13
2 Average	3.494 MHz	29.14 L1		-16.85

TEST REPORT

Tested Wire: Neutral

Operation Mode: EUT ON Continuously + heating mode (worst case)



EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CE1511QP			
Trace2:	CE1511AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV		DELTA LIMIT dB
1 Quasi Peak	61.72 kHz	57.49	L1	-30.58
1 Quasi Peak	64.04 kHz	57.18	L1	-30.56
1 Quasi Peak	166 kHz	41.36	L1	-23.79
1 Quasi Peak	202 kHz	41.34	L1	-22.18
1 Quasi Peak	1.398 MHz	35.50	L1	-20.49
2 Average	1.398 MHz	30.19	L1	-15.80
2 Average	1.746 MHz	30.79	L1	-15.20
1 Quasi Peak	1.754 MHz	32.68	L1	-23.31
1 Quasi Peak	3.042 MHz	33.08	L1	-22.91
1 Quasi Peak	3.49 MHz	35.22	L1	-20.78
2 Average	4.194 MHz	27.72	L1	-18.27
2 Average	6.982 MHz	27.40	L1	-22.59

TEST REPORT

5.2 FCC part 18 Radiated Emission 9 kHz to 30 MHz

Test Result: N/A

Not applicable. Please refer to § 18.307 (f) Conduction limits and § 18.309 frequency range of measurements for details.

§ 18.307 (f) Conduction limits:

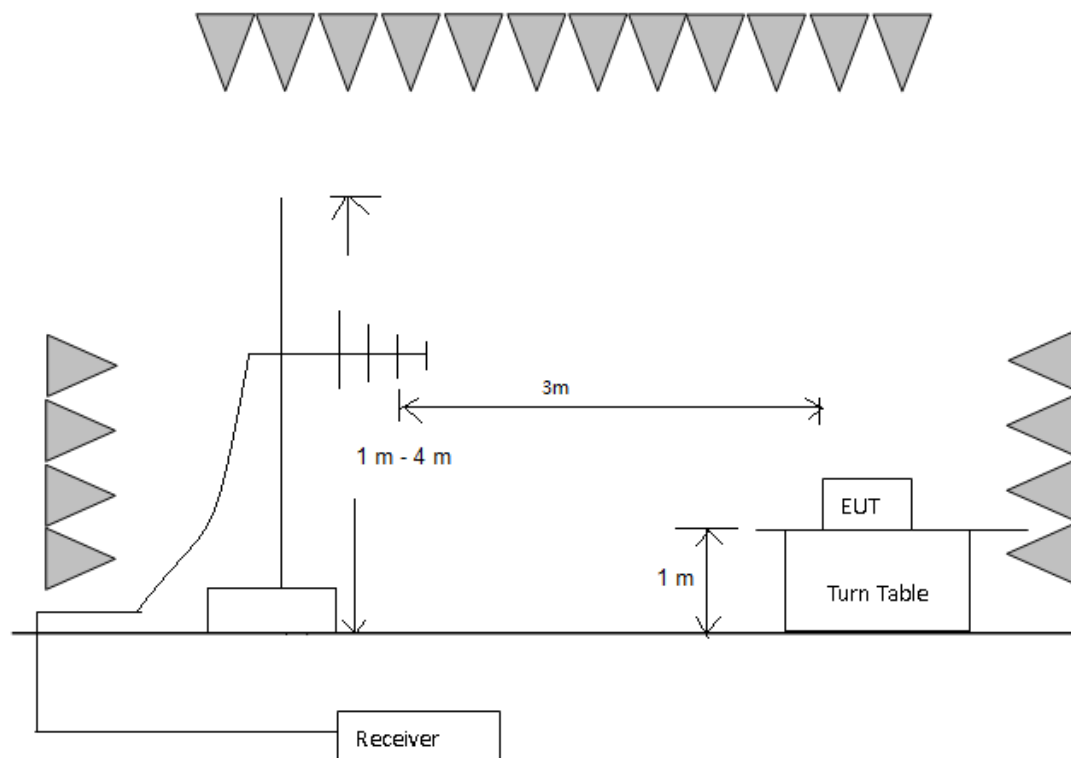
For ultrasonic equipment, compliance with the conducted limits shall preclude the need to show compliance with the field strength limits below 30 MHz unless requested by the Commission.

TEST REPORT

5.3 FCC part 18 Radiated Emission 30 MHz -1000 MHz

Test Result: Pass

5.3.1 Block Diagram of Test Setup



5.3.2 Test Setup and Procedure

The measurement was applied in a semi-anechoic chamber. The EUT and simulators were placed on a 1 m high foam table above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mask. The antenna moved up and down between from 1 meter to 4 meters to find out the maximum emission level.

Broadband antenna was used as receiving antenna. Both horizontal and vertical polarization of the antenna was set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to FCC OST/MP-5 requirement during radiated test.

The bandwidth setting on R&S Test Receiver was 120 kHz.

The frequency range from 30 MHz to 1000 MHz was checked

TEST REPORT

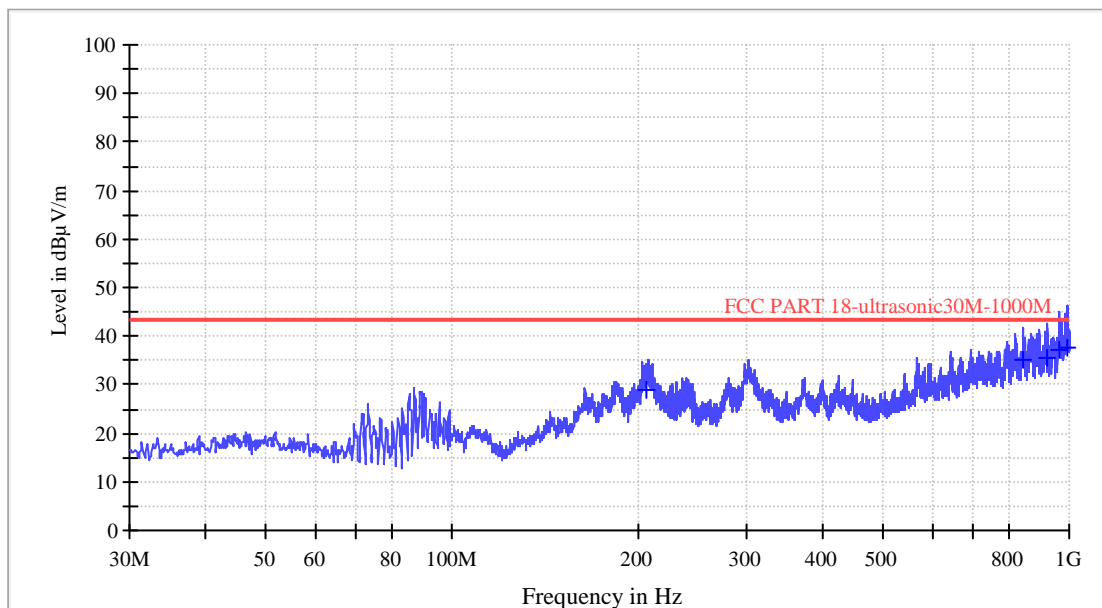
5.3.3 Limit

Frequency range (MHz)	Field strength at 30 meters ($\mu\text{V}/\text{m}$)	Field strength at 3 meters (dB $\mu\text{V}/\text{m}$)
30-1000	15	43.5
Note: Test limit is calculated and base on equipment type and operating frequency. Detector: Peak for pre-scan, Average for the final result		

TEST REPORT

5.3.4 Test Data and Curve

Operation Mode: EUT ON Continuously + heating mode (worst case)
Horizontal



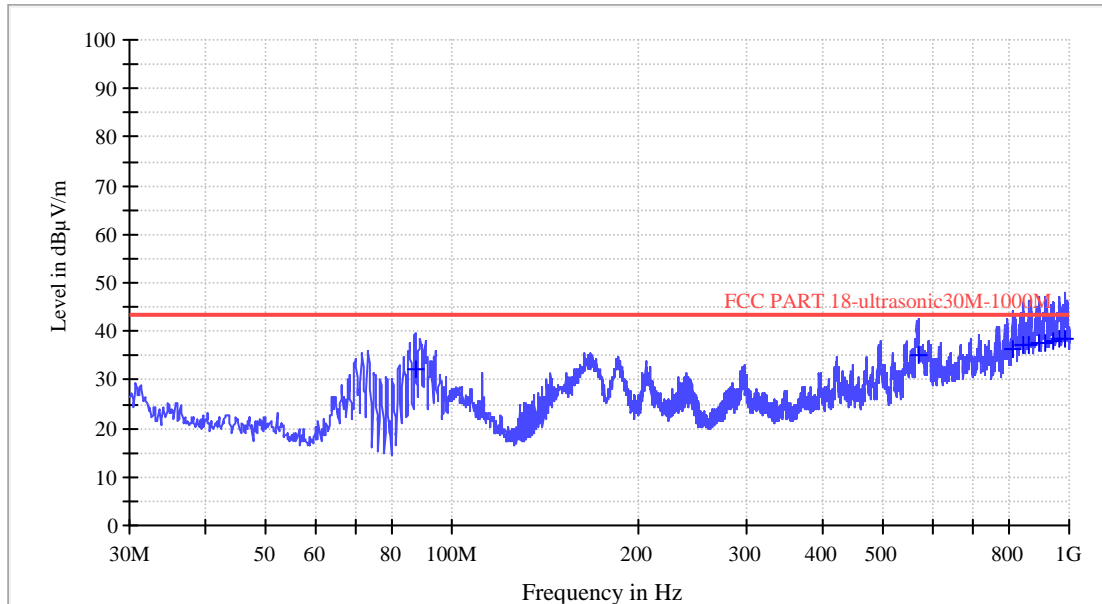
Frequency (MHz)	Receiver Reading Level (dBμV)	Correction factors (dB/m)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
206.80	16.2	12.8	29.0	43.5	-14.5
843.72	10.1	24.9	35.0	43.5	-8.5
918.28	9.9	25.8	35.7	43.5	-7.8
965.32	11.1	26.2	37.3	43.5	-6.2
989.68	11.3	26.4	37.7	43.5	-5.8

Remark:

1. Corr. (dB) = Antenna Factor (dB) + Cable Loss (dB)
2. Average (dBμV/m) = Corr. (dB) + Read Level (dBμV)
3. Margin (dB) = Average (dBμV/m) – Limit AVG (dBμV/m)

TEST REPORT

Vertical



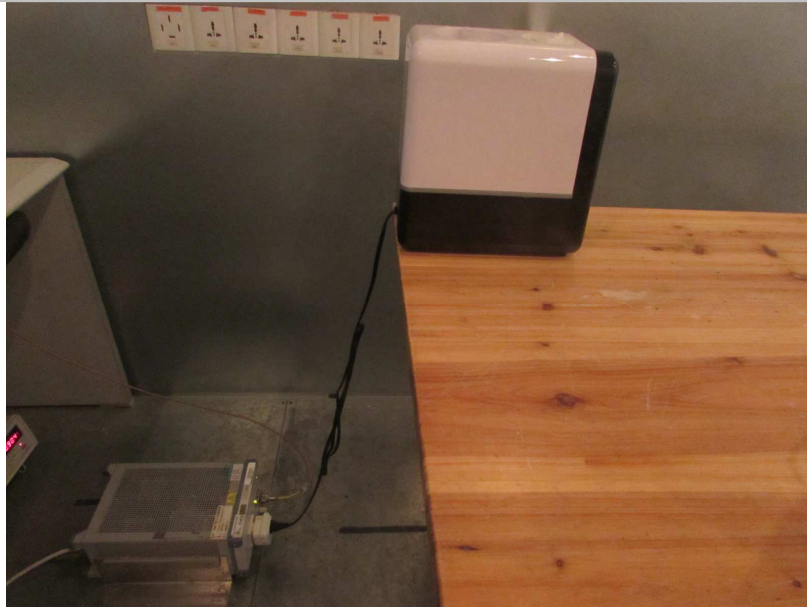
Frequency (MHz)	Receiver Reading Level (dBμV)	Correction factors (dB/m)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
87.12	22.4	10.0	32.4	43.5	-11.1
568.72	13.7	21.2	34.9	43.5	-8.6
813.52	11.9	24.5	36.4	43.5	-7.1
839.48	12.2	24.8	37.0	43.5	-6.5
864.20	12	25.2	37.2	43.5	-6.3
892.56	12	25.6	37.6	43.5	-5.9
914.04	12	25.8	37.8	43.5	-5.7
940.24	12	26.0	38.0	43.5	-5.5
963.88	12.3	26.2	38.5	43.5	-5
985.44	11.8	26.4	38.2	43.5	-5.3

1. Corr. (dB) = Antenna Factor (dB) + Cable Loss (dB)
2. Average (dBμV/m) = Corr. (dB) + Read Level (dBμV)
3. Margin (dB) = Average (dBμV/m) – Limit AVG (dBμV/m)

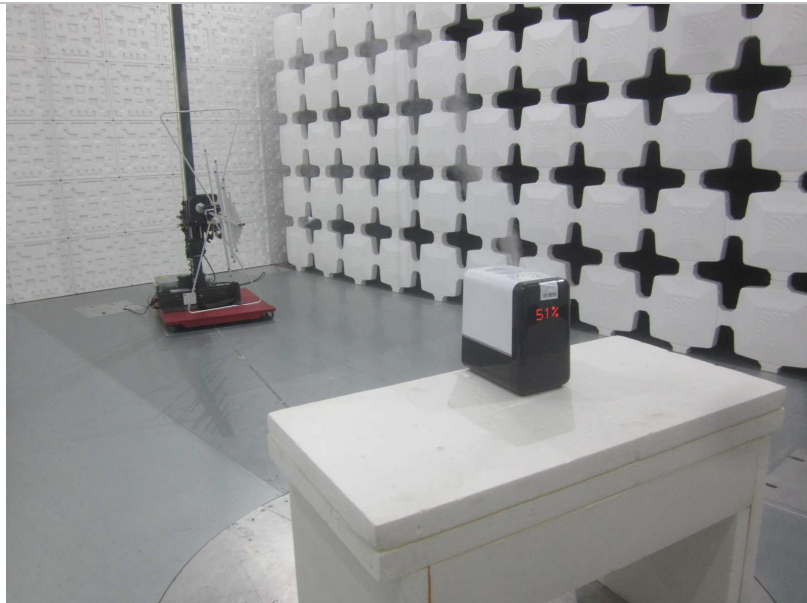
TEST REPORT

6. APPENDIX I - PHOTOS OF TEST SETUP

Conducted Emission



Radiated Emission (30 MHz–1000 MHz)



*****End of Report*****