

Test Report

Verified code: 591611

Report No.: E202111252962-2-G1

Customer: Hydrow, Inc.

Address: 10 Summer St, Floor 5, Boston, MA 02110, USA

Sample Name: Hydrow Touchscreen Monitor

Sample Model: CVC15101

Receive Sample Date: Nov.26,2021

Test Date: Dec.03,2021 ~ Dec.21,2021

Reference Document: CFR 47, FCC Parts Subpart E Unlicensed National Information Infrastructure Devices

Test Result: Pass

Prepared by: Yang Zhaoyun

Reviewed by: Jiang Tao

Approved by: Xiao Liang



GUANGZHOU GRG METROLOGY & TEST CO., LTD

Issued Date: 2022-03-29

GUANGZHOU GRG METROLOGY & TEST CO., LTD.

Address: No.163, Pingyun Road, West of Huangpu Avenue, Guangzhou, Guangdong, China
Tel: (+86) 400-602-0999 FAX: (+86) 020-38698685 Web: <http://www.grgtest.com>



Statement

1. The report is invalid without "special seal for inspection and testing"; some copies are invalid; The report is invalid if it is altered or missing; The report is invalid without the signature of the person who prepared, reviewed and approved it.
2. The sample information is provided by the client and responsible for its authenticity; The content of the report is only valid for the samples sent this time.
3. When there are reports in both Chinese and English, the Chinese version will prevail when the language problems are inconsistent.
4. If there is any objection concerning the report, please inform us within 15 days from the date of receiving the report.
5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.

----- The following blanks -----

Table of Contents

1.	TEST RESULT SUMMARY	6
2.	GENERAL DESCRIPTION OF EUT.....	7
2.1.	APPLICANT	7
2.2.	MANUFACTURER	7
2.3.	FACTORY	7
2.4.	BASIC DESCRIPTION OF EQUIPMENT UNDER TEST	7
2.5.	TEST OPERATION MODE	8
2.6.	LOCAL SUPPORTIVEINSTRUMENTS.....	9
2.7.	CONFIGURATION OF SYSTEM UNDER TEST	9
2.8.	DUTY CYCLE.....	11
3.	LABORATORY AND ACCREDITATIONS	13
3.1.	LABORATORY	13
3.2.	ACCREDITATIONS	13
3.3.	MEASUREMENT UNCERTAINTY	14
4.	LIST OF USED TEST EQUIPMENT AT GRGT	15
5.	CONDUCTED EMISSION MEASUREMENT	16
5.1.	LIMITS.....	16
5.2.	TEST PROCEDURES	16
5.3.	TEST SETUP	17
5.4.	DATA SAMPLE	17
5.5.	TEST RESULTS	18
6.	RADIATED SPURIOUS EMISSIONS	20
6.1.	LIMITS.....	20
6.2.	TEST PROCEDURES	21
6.3.	TEST SETUP	23
6.4.	DATA SAMPLE	24
6.5.	TEST RESULTS	25
7.	RESTRICTED BANDS OF OPERATION.....	51
7.1.	LIMITS.....	51
7.2.	TEST PROCEDURES	51
7.3.	TEST SETUP	52
7.4.	TEST RESULTS	53
8.	6DB BANDWIDTH & 26DB BANDWIDTH & 99% OCCUPIED BANDWIDTH.....	95
8.1.	LIMITS.....	95
8.2.	TEST PROCEDURES	95
8.3.	TEST SETUP	96
8.4.	TEST RESULTS	97
9.	OUTPUT POWER	157
9.1.	LIMITS.....	157
9.2.	TEST PROCEDURES	157
9.3.	TEST SETUP	157

9.4. TEST RESULTS 158

10. POWER SPECTRAL DENSITY 161

10.1. LIMITS..... 161

10.2. TEST PROCEDURES 161

10.3. TEST SETUP 161

10.4. TEST RESULTS 162

11. FREQUENCY STABILITY 193

11.1. LIMITS..... 193

11.2. TEST PROCEDURES 193

11.3. TEST SETUP 194

11.4. TEST RESULTS 195

APPENDIX A. PHOTOGRAPH OF THE TEST CONNECTION DIAGRAM 200

APPENDIX B. PHOTOGRAPH OF THE EUT 200

----- The following blanks -----

REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E202111252962-2	Original Issue	2022/02/23
2.0	E202111252962-2-G1	Update	2022/03/28

Version 2.0:

1. On the basis of the original report, update the description of test items in the report.
2. This report instead the report E202111252962-2, and from the date of issuance of this report, the report which being replaced become invalid.

----- The following blanks -----

1. TEST RESULT SUMMARY

Standard	Item	Limit / Severity	Result
CFR 47, FCC Parts Subpart E (§15.407)	6dB Bandwidth & 26dB Bandwidth & 99% Occupied Bandwidth	15.407(a) 15.407(e)	PASS
	AC Power Line Conducted Emissions	15.207 15.407(b)(9)	PASS
	Unwanted Emissions and Band Edge	15.205 15.209 15.407(b)	PASS
	Output Power	15.407(a)	PASS
	Peak Power Spectral Density	15.407(a)	PASS
	Frequency Stability	15.407(g)	PASS
	Antenna Requirement	15.203	PASS ¹⁾

Note: ¹⁾ The EUT have two antennas. The antenna is Internal antenna.

The max gain of antenna is 3.3dBi, which accordance 15.203 is considered sufficient to comply with the provisions of this section.

----- The following blanks -----

2. GENERAL DESCRIPTION OF EUT

2.1. APPLICANT

Name: Hydrow, Inc.
Address: 10 Summer St, Floor 5, Boston, MA 02110, USA

2.2. MANUFACTURER

Name: Chengdu Vantron Technology Co., Ltd.
Address: No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China 610045

2.3. FACTORY

Name: Chengdu Vantron Technology Co., Ltd.
Address: No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China 610045

2.4. BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Product Name: Hydrow Touchscreen Monitor
Product Model: CVC15101
Adding Model: /
FCC ID: 2A3HV-CVC15A
Trade Name: Hydrow
Power Supply: DC12V Power supplied by adapter
Adapter Model No: WT1205000
Specification: In put:100-240V~50/60Hz 1.6A
Out put: 12V--- 5.0A
Frequency Band: U-NII-1: 5180 MHz~5240 MHz
U-NII-3: 5745 MHz~5825 MHz
Modulation Type: OFDM
Antenna Specification: Internal antenna
U-NII-1:
Antenna 1 with 2.4dBi gain (Max.)
Antenna 2 with 2.1dBi gain (Max.)
U-NII-3:
Antenna 1 with 2.8dBi gain (Max.)
Antenna 2 with 3.3dBi gain (Max.)
Number Of Channel: U-NII-1:
IEEE 802.11a / n HT20 / ac VHT20: 4 Channels
IEEE 802.11n HT40 / ac VHT40: 2 Channels
IEEE 802.11ac VHT80: 1 Channel
U-NII-3:

IEEE 802.11a / n HT20 / ac VHT20: 5 Channels
 IEEE 802.11n HT40 / ac VHT40: 2 Channels
 IEEE 802.11ac VHT80: 1 Channel

Channels Spacing: IEEE 802.11a: 20MHz
 IEEE 802.11n HT20: 20MHz
 IEEE 802.11n HT40: 40MHz
 IEEE 802.11ac VHT20: 20MHz
 IEEE 802.11ac VHT40: 40MHz
 IEEE 802.11ac VHT80: 80MHz

Transmit Power: U-NII-1:
 15.06dBm for IEEE 802.11a
 17.25dBm for IEEE 802.11n HT20
 16.08dBm for IEEE 802.11ac VHT20
 17.12dBm for IEEE 802.11n HT40
 15.15dBm for IEEE 802.11ac VHT40
 15.30dBm for IEEE 802.11ac VHT80
 U-NII-3:
 14.84dBm for IEEE 802.11a
 17.38dBm for IEEE 802.11n HT20
 16.88dBm for IEEE 802.11ac VHT20
 17.78dBm for IEEE 802.11n HT40
 16.84dBm for IEEE 802.11ac VHT40
 16.76dBm for IEEE 802.11ac VHT80

Temperature Range: -20°C~85°C

Hardware Version: V1.1

Software Version: V1.0

Sample submitting way: ☒ Provided by customer ☐ Sampling

Sample No: E202111252962-0001, E202111252962-0002

Note: /

2.5. TEST OPERATION MODE

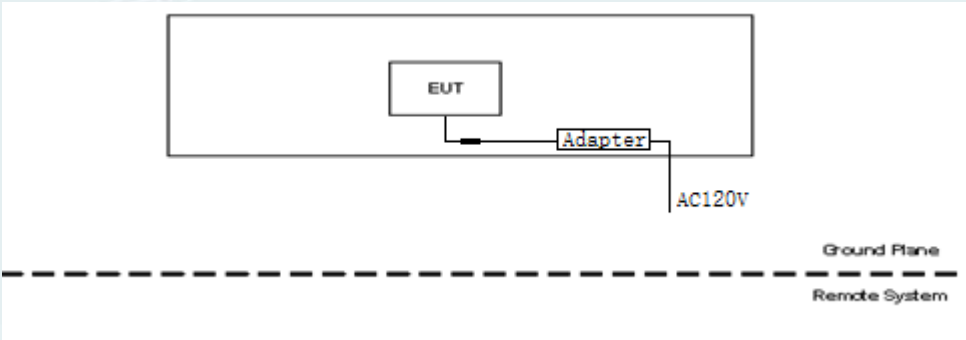
Mode No.	Description of the modes
1	5G Wi-Fi TX mode

Note: The items of radiated emission just record the worst case of 20MHz/40MHz/80MHz bandwidth.

2.6. LOCAL SUPPORTIVEINSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Note
Adapter	Wen Tong	WT1205000	A211014000600	/
Cable				
AC cable (DC power)	/	/	/	UnShielded, 1.0m
DC cable (DC power)	/	/	/	Shielded, 1.0m

2.7. CONFIGURATION OF SYSTEM UNDER TEST



Test software:

Software version
ADB

Power Setting:

Mode	Frequency (MHz)	Power Setting (ant1)	Frequency (MHz)	Power Setting (ant2)
IEEE 802.11a	5180	14	5180	13
	5200	14	5200	13
	5240	14	5240	13
	5745	14	5745	13
	5785	14	5785	13
	5825	14	5825	13

Mode	Frequency (MHz)	Power Setting	Mode	Frequency (MHz)	Power Setting
IEEE 802.11n HT20	5180	14	IEEE 802.11ac VHT20	5180	13
	5200	14		5200	13
	5240	14		5240	13
	5745	14		5745	13
	5785	14		5785	13
	5825	15		5825	13

Mode	Frequency (MHz)	Power Setting	Mode	Frequency (MHz)	Power Setting
IEEE 802.11n HT40	5190	14	IEEE 802.11ac VHT40	5190	12
	5230	12		5230	12
	5755	14		5755	13
	5795	14		5795	13

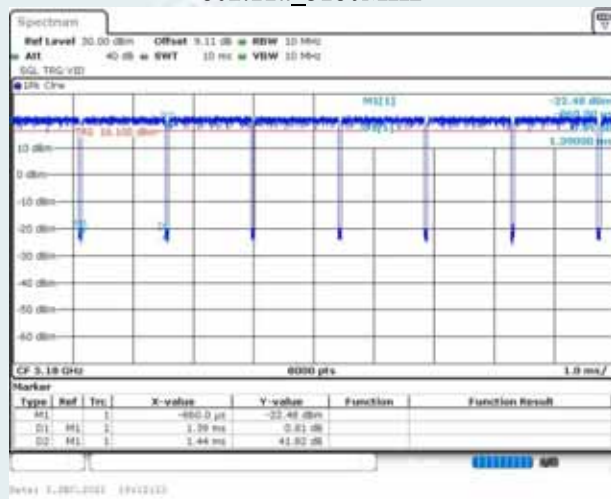
Mode	Frequency (MHz)	Power Setting	Frequency (MHz)	Power Setting
IEEE 802.11ac VHT80	5210	12	5775	13

2.8. DUTY CYCLE

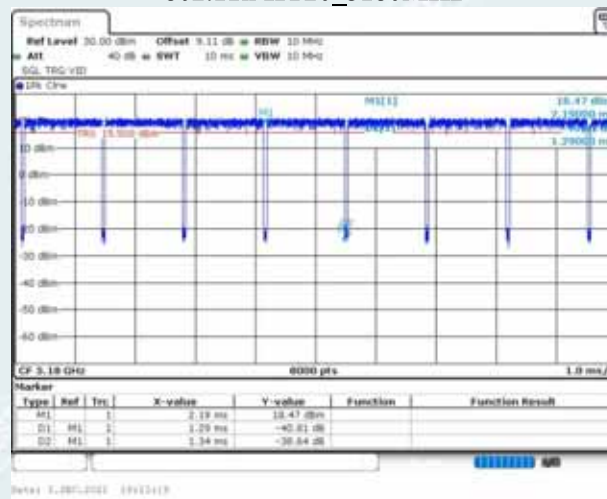
EUT Name	Hydrow Touchscreen Monitor	Model	CVC15101
Environmental Conditions	23.5°C/48%RH	Test Voltage	AC120V/60Hz
Tested By	Lu Wei	Tested Date	2021/12/03~2021/12/09

Duty Cycle Calculation						
	Mode	ON Time(ms)	Total Time(ms)	Duty Cycle	Duty Factor	T(s)
duty cycle	802.11a	1.39	1.44	96.53%	0.15	0.00139
	802.11n HT20	1.29	1.34	96.27%	0.17	0.00129
	802.11n HT40	0.65	0.70	92.86%	0.32	0.00065
	802.11ac VHT20	1.30	1.35	96.30%	0.16	0.00130
	802.11ac VHT40	0.65	0.70	92.86%	0.32	0.00065
	802.11ac VHT80	0.32	0.37	86.49%	0.63	0.00032

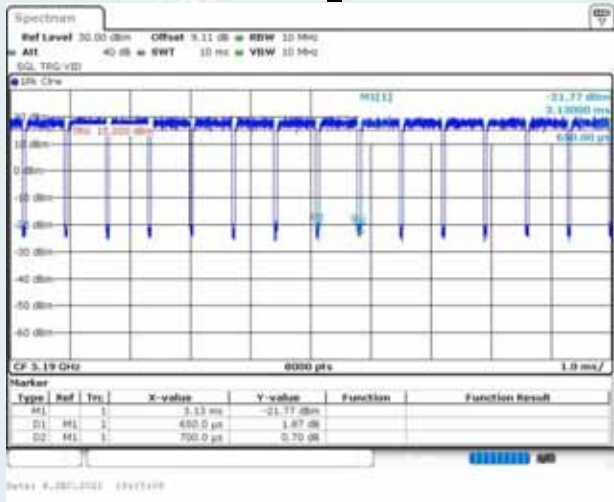
802.11a_5180MHz



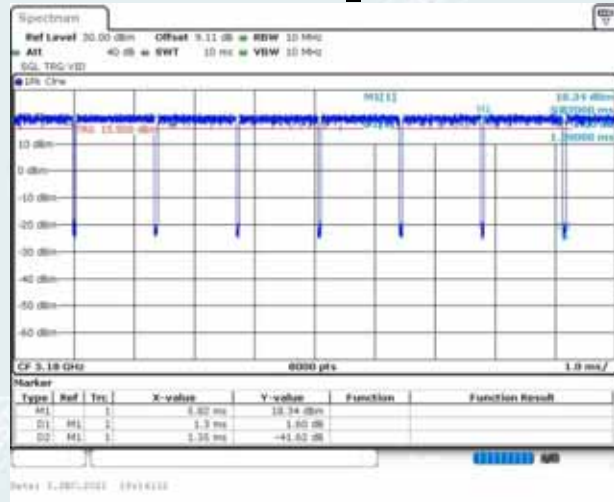
802.11n HT20_5180MHz



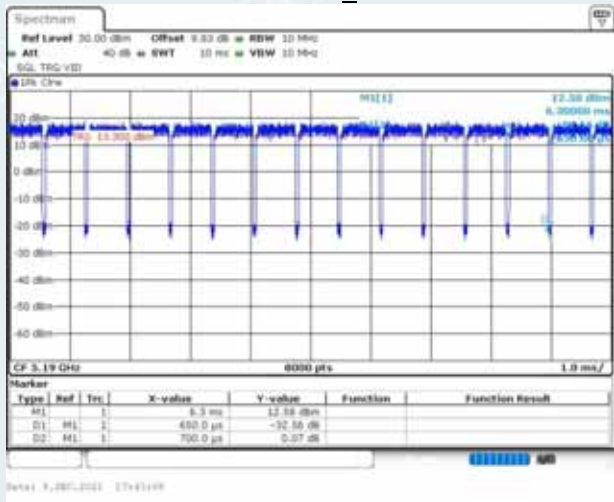
802.11n HT40_5190MHz



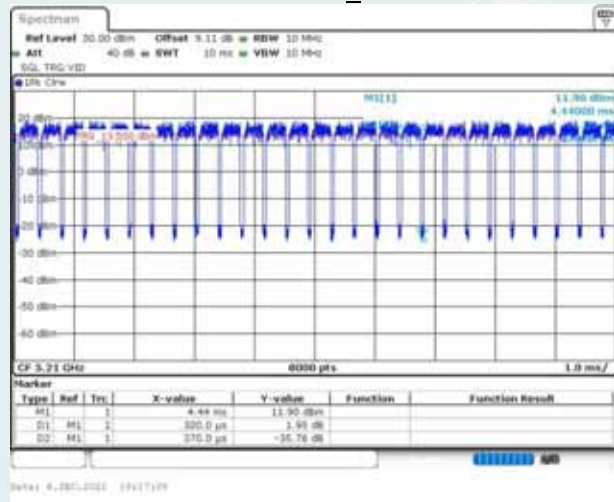
802.11ac VHT20_5180MHz



802.11ac VHT40_5190MHz



802.11ac VHT80_5210MHz



----- The following blanks -----

3. LABORATORY AND ACCREDITATIONS

3.1. LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of Guangzhou GRG Metrology & Test Co., Ltd.

Add : No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District
Shenzhen, 518110, People's Republic of China
P.C. : 518000
Tel : 0755-61180008
Fax : 0755-61180008

3.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA A2LA(Certificate #2861.01)

China CNAS(L0446)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada ISED (Company Number: 24897, CAB identifier:CN0069)

USA FCC (Registration Number: 759402, Designation Number:CN1198)

Copies of granted accreditation certificates are available for downloading from our web site,
<http://www.grgtest.com>

----- The following blanks -----

3.3. 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:

Measurement		Frequency	Uncertainty
Radiated Emission	Horizontal	9kHz~30MHz	4.46dB
		30MHz~1000MHz	4.30dB
		1GHz~18GHz	5.60dB
		18GHz~26GHz	3.65dB
		26GHz~40GHz	4.00dB
	Vertical	9kHz~30MHz	4.46dB
		30MHz~1000MHz	4.30dB
		1GHz~18GHz	5.60dB
		18GHz~26GHz	3.65dB
		26GHz~40GHz	4.00dB
Conduction Emission		9kHz~150kHz	2.80dB
		150kHz~10MHz	2.80dB
		10MHz~30MHz	2.20dB

Measurement	Uncertainty
RF frequency	6.0×10^{-6}
RF power conducted	0.78 dB
Occupied channel bandwidth	0.4 dB
Unwanted emission, conducted	0.68 dB
Humidity	6 %
Temperature	2 °C

This uncertainty represents an expanded uncertainty factor of k=2.

----- The following blanks -----

4. LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Conducted Emissions				
TEST RECEIVER	R&S	ESCI	100783	2022-09-13
LISN(EUT)	R&S	ENV216	101543	2022-03-21
EZ-EMC	EZ	CCS-3A1-CE	/	/
Radiated Spurious Emission&Restricted bands of operation				
Test S/W	EZ	CCS-2ANT		
Loop Antenna	TESEQ	HLA6121	52599	2022-04-21
Test Receiver	R&S	ESR7	102444	2022-09-22
Preamplifier	EMEC	EM330	/	2022-03-21
Bi-log Antenna	TESEQ	CBL6143A	32399	2022-11-25
Spectrum Analyzer	Agilent	N9010A	MY52221469	2022-04-16
Horn Antenna	Schwarzbeck	BBHA9120D(1201)	02143	2022-10-22
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170-497	2022-10-16
Amplifier	Tonscend	TAP01018048	AP20E8060075	2022-05-09
Amplifier	Tonscend	TAP184050	AP20E806071	2022-05-17
Test S/W	Tonscend	JS32-RE/2.5.2.4		
6DB Bandwidth &26DB Bandwidth& 99% Occupied bandwidth				
Spectrum Analyzer	R&S	FSV30	104381-rH	2022-12-10
Output Power				
Pulse power sensor	Anritsu	MA2411B	1126150	2022-03-21
Power Meter	Anritsu	NL2495A	1204003	2022-03-21
Frequency Stability				
Spectrum Analyzer	R&S	FSV30	104381-rH	2022-12-10
Temperature& humidity chamber	HOSON	HS01060SDF	1910008401	2022-09-02
Power Spectral Density				
Spectrum Analyzer	R&S	FSV30	104381-rH	2022-12-10

Note: The calibration interval of the above test instruments is 12 months.

5. CONDUCTED EMISSION MEASUREMENT

5.1. LIMITS

Frequency range	Limits (dBμV)	
	Quasi-peak	Average
150kHz~0.5MHz	66~56	56~46
0.5MHz~5MHz	56	46
5MHz~30MHz	60	50

NOTE: (1) The lower limit shall apply at the transition frequencies.

(2) The limit decreases in line with the logarithm of the frequency in the range of 150 kHz to 0.5MHz.

5.2. TEST PROCEDURES

Procedure of Preliminary Test

Test procedures follow ANSI C63.10:2013.

For measurement of the disturbance voltage the equipment under test (EUT) is connected to the power supply mains and any other extended network via one or more artificial network(s). An EUT, whether intended to be grounded or not, and which is to be used on a table is configured as follows:

– Either the bottom or the rear of the EUT shall be at a controlled distance of 40 cm from a reference ground plane. This ground plane is normally the wall or floor of a shielded room. It may also be a grounded metal plane of at least 2 m by 2 m. This is physically accomplished as follows:

1) place the EUT on a table of non-conducting material which is at least 80 cm high. Place the EUT so that it is 40 cm from the wall of the shielded room, or

2) place the EUT on a table of non-conducting material which is 40 cm high so that the bottom of the EUT is 40 cm above the ground plane;

– All other conductive surfaces of the EUT shall be at least 80 cm from the reference ground plane;

– The EUT are placed on the floor that one side of the housings is 40 cm from the vertical reference ground plane and other metallic parts;

– Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 cm to 40 cm long, hanging approximately in the middle between the ground plane and the table.

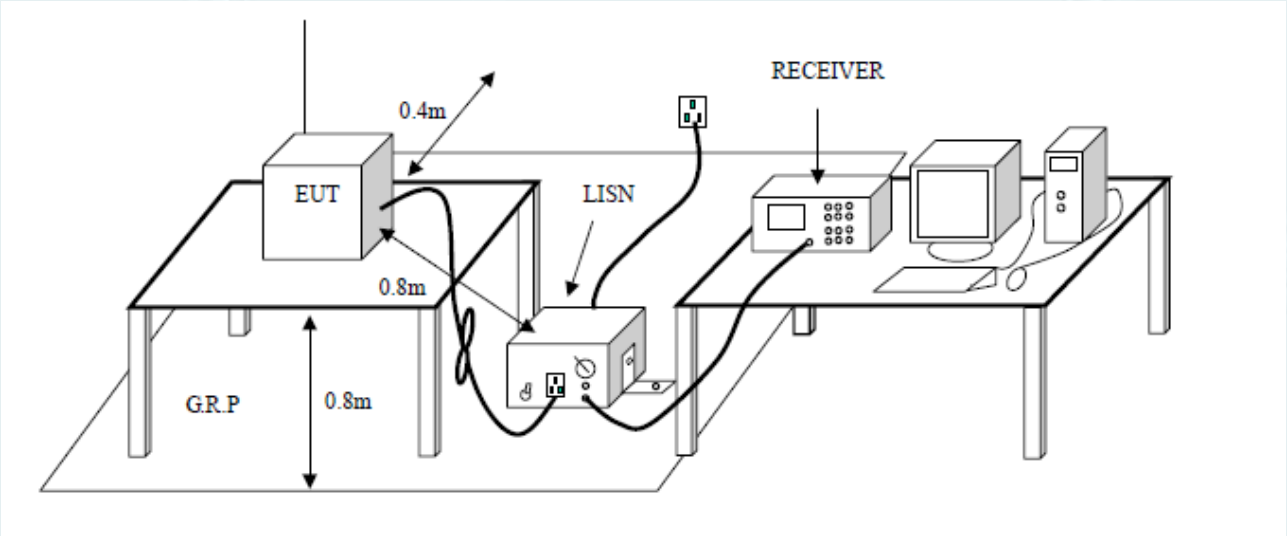
– Use serial board or connecting line to make EUT and notebook to communicate, according to the actual demand to make EUT emit fixed frequency signal.

The test mode(s) described in Item 2.5 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.5 producing the highest emission level. The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test. A scan was taken on both power lines, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

5.3. TEST SETUP



5.4. DATA SAMPLE

Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XXXX	32.69	25.65	11.52	44.21	37.17	65.78	55.79	-21.57	-18.62	Pass

Factor = Insertion loss of LISN + Cable Loss
Result = Quasi-peak Reading/ Average Reading + Factor
Limit = Limit stated in standard
Margin = Result (dBuV) – Limit (dBuV)

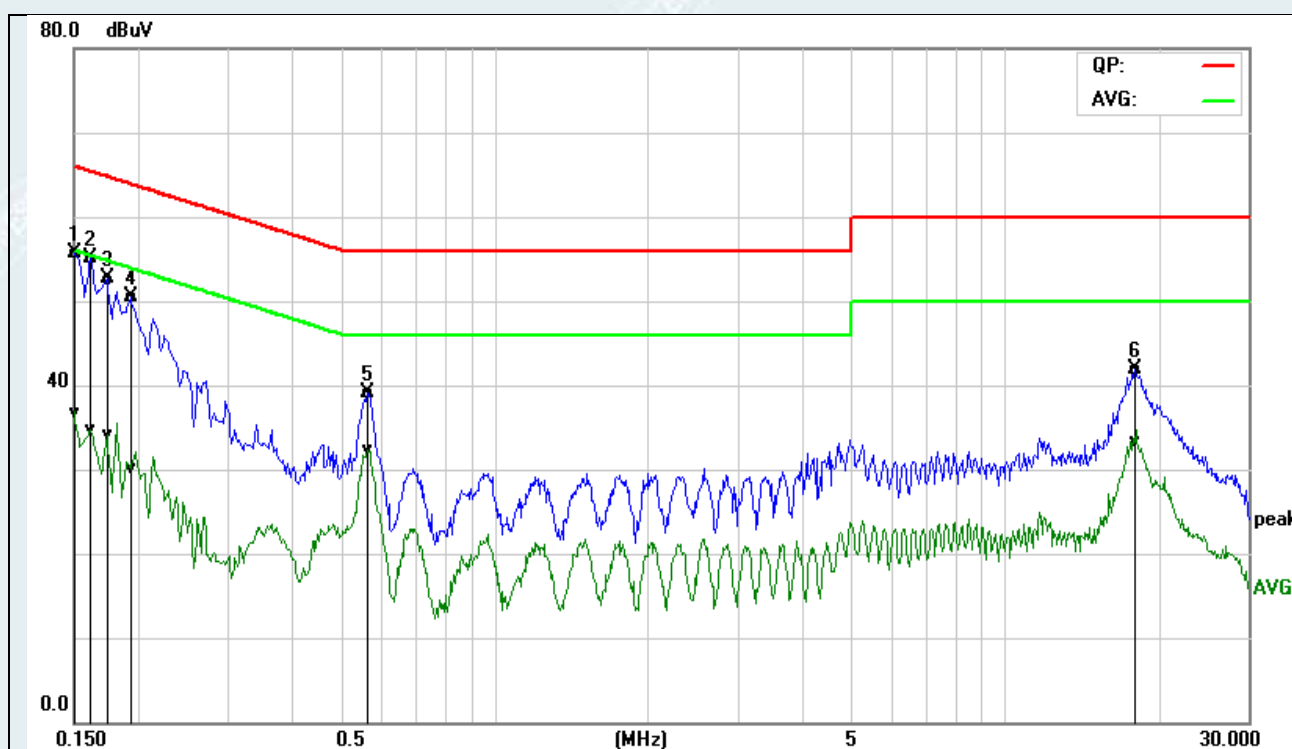
----- The following blanks -----

5.5. TEST RESULTS

All models were pretested and only the worst modes and channels were recorded in this report. (IEEE 802.11a 5180MHz)

EUT Name	Hydrow Touchscreen Monitor	Model	CVC15101
Environmental Conditions	22.0°C/53%RH	Test Mode	Mode 1
Power supply	AC120V/60Hz	Test Engineer	Zeng Xianglong
Test Date	2021/12/21	Sample No.	E202111252962-0002

IEEE 802.11a:5180MHz



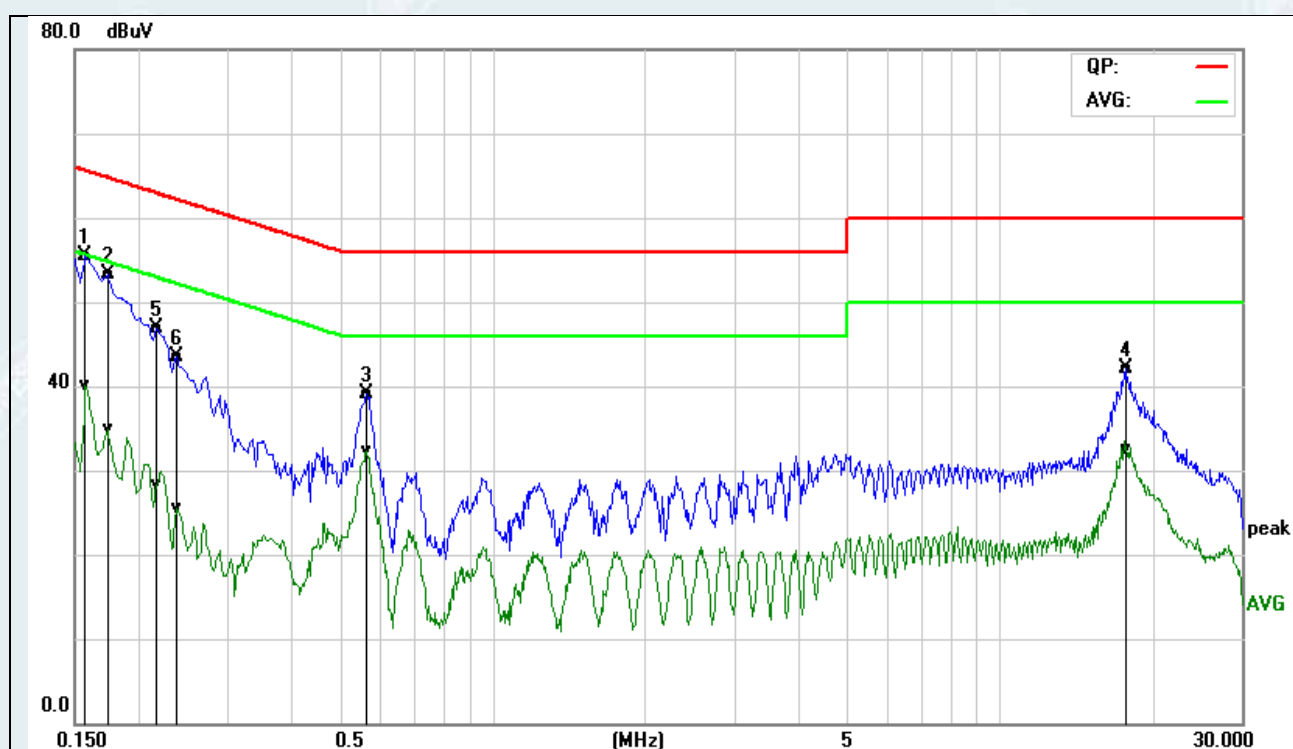
No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.1500	46.16	27.27	9.53	55.69	36.80	65.99	56.00	-10.30	-19.20	Pass
2*	0.1620	45.58	25.13	9.53	55.11	34.66	65.36	55.36	-10.25	-20.70	Pass
3	0.1740	43.07	24.66	9.53	52.60	34.19	64.76	54.77	-12.16	-20.58	Pass
4	0.1940	40.88	20.65	9.54	50.42	30.19	63.86	53.86	-13.44	-23.67	Pass
5	0.5660	29.58	22.71	9.57	39.15	32.28	56.00	46.00	-16.85	-13.72	Pass
6	17.9820	32.08	23.51	9.89	41.97	33.40	60.00	50.00	-18.03	-16.60	Pass

Note:

L = Live Line

EUT Name	Hydrow Touchscreen Monitor	Model	CVC15101
Environmental Conditions	22.0°C/53%RH	Test Mode	Mode 1
Power supply	AC120V/60Hz	Test Engineer	Zeng Xianglong
Test Date	2021/12/21	Sample No.	E202111252962-0002

IEEE 802.11a:5180MHz



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1*	0.1580	45.93	30.63	9.51	55.44	40.14	65.56	55.57	-10.12	-15.43	Pass
2	0.1740	43.77	25.40	9.53	53.30	34.93	64.76	54.77	-11.46	-19.84	Pass
3	0.5660	29.33	22.52	9.69	39.02	32.21	56.00	46.00	-16.98	-13.79	Pass
4	17.6620	32.27	22.54	9.92	42.19	32.46	60.00	50.00	-17.81	-17.54	Pass
5	0.2180	37.25	18.77	9.58	46.83	28.35	62.89	52.89	-16.06	-24.54	Pass
6	0.2380	33.89	15.96	9.59	43.48	25.55	62.16	52.17	-18.68	-26.62	Pass

Note: N = Neutral Line.

6. RADIATED SPURIOUS EMISSIONS

6.1. LIMITS

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

The unwanted emissions which fall in Restricted bands shall not exceed the field strength levels specified in the following table:

15.209 Radiated emission limits

Frequency (MHz)	Field Strength(μ V/m)	Distance(m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

----- The following blanks -----

6.2. TEST PROCEDURES

- EUT was placed on a turn table, which is 0.8 meter high above ground for below 1GHz test, and which is 1.5 meter high above ground for above 1GHz test.
- EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower.
- Set the EUT transmit continuously with maximum output power.
- The turn table can rotate 360 degrees to determine the position of the maximum emission level.
- The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.
- Spectrum analyzer setting parameters please see the below table.
- Repeat above procedures until all channels were measured.
- Record the results in the test report.

For 9kHz-150kHz

Spectrum Parameters	Setting
RBW	300Hz(for Peak&AVG)/CISPR 200Hz(for QP)
VBW	300Hz(for Peak&AVG)/CISPR 200Hz(for QP)
Start frequency	9kHz
Stop frequency	150kHz
Sweep Time	Auto
Detector	PEAK/QP/AVG
Trace Mode	Max Hold

Note : For 9kHz-90kHz&110kHz-150kHz,the detector is average,other frequency is CISPR QP detector.

For 150kHz-30MHz

Spectrum Parameters	Setting
RBW	9kHz
VBW	9kHz
Start frequency	150kHz
Stop frequency	30MHz
Sweep Time	Auto
Detector	QP
Trace Mode	Max Hold

Note : For 150kHz-490kHz,the detector is average,other frequency is CISPR QP detector.

For 30MHz-1GHz

Spectrum Parameters	Setting
RBW	120kHz
VBW	300kHz
Start frequency	30MHz
Stop frequency	1GHz
Sweep Time	Auto
Detector	QP
Trace Mode	Max Hold

For Above 1GHz

Spectrum Parameters	Setting	
RBW	1MHz	
VBW	PEAK Measurement	AVG Measurement
	3MHz	Duty cycle $\geq$ 98%,VBW=10Hz Duty cycle<98%,VBW $\geq$ 1/T Video bandwidth mode=RMS (power averaging)
Start frequency	1GHz	
Stop frequency	40GHz	
Sweep Time	Auto	
Detector	PEAK	
Trace Mode	Max Hold	

Note :

- (1) T is the on-time time of the duty cycle,when EUT transmit continuously with maximum output power,unit is seconds. reference section 2.8 for the on-time time.
- (2) Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:

$$E = \text{EIRP} - 20\log D + 104.8$$
 where:
 E = electric field strength in dB μ V/m,
 EIRP = equivalent isotropic radiated power in dBm
 D = specified measurement distance in meters.
 So: $E = -27 - 20\log 3 + 104.8 = 68.3$ (dB μ V/m).
- (3) The unwanted emissions which fall in Restricted bands shall not exceed the field strength ,Above 18G test distance is 1m, so the Peak Limit= $74 + 20*\log(3/1) = 83.54$ (dB μ V/m).
 The Avg Limit= $54 + 20*\log(3/1) = 63.54$ (dB μ V/m).
- (4) The maximum emissions of the operation frequency bands ,Above 18G test distance is 1m, so the Peak Limit= $68.3 + 20*\log(3/1) = 77.84$ (dB μ V/m).

----- The following blanks -----

6.3. TEST SETUP

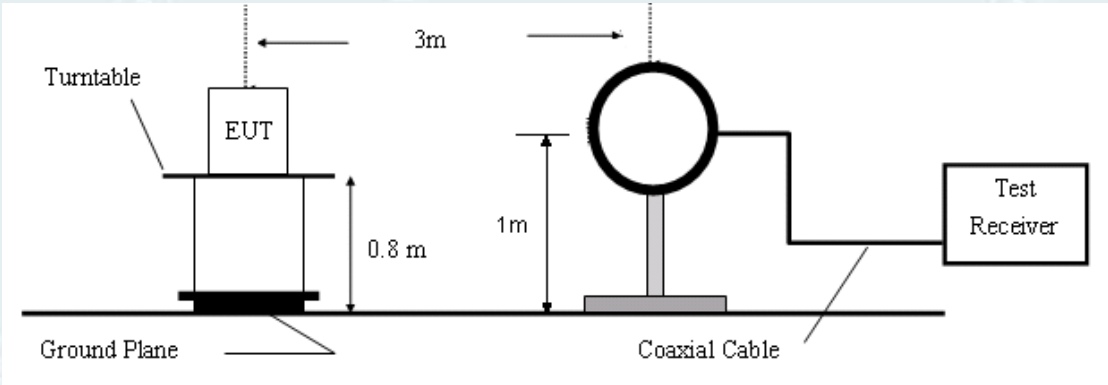


Figure 1. 9kHz to 30MHz radiated emissions test configuration

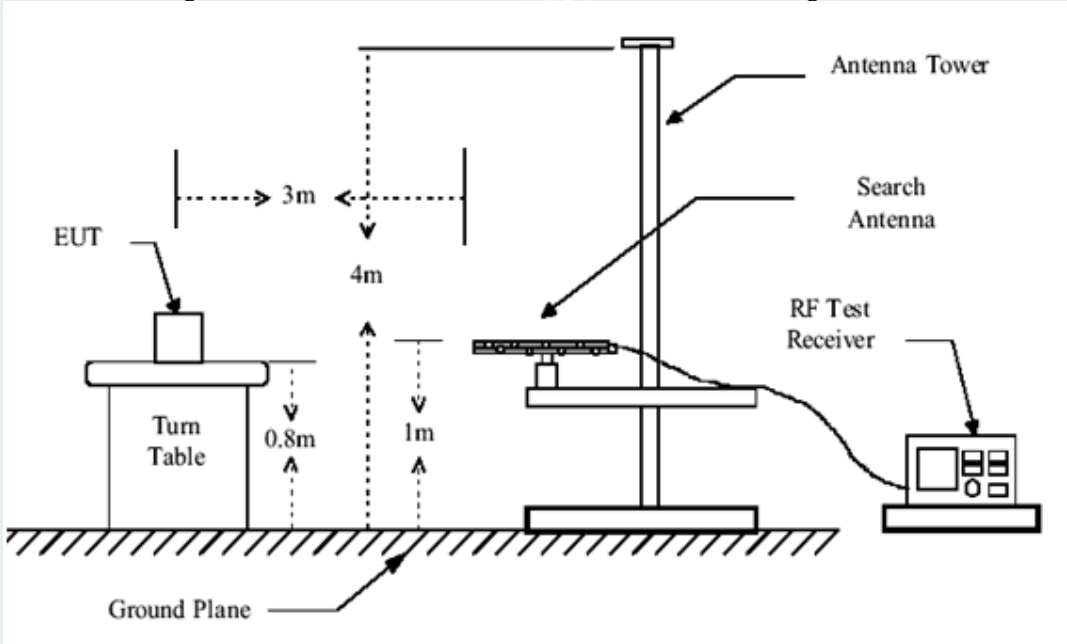


Figure 2. 30MHz to 1GHz radiated emissions test configuration

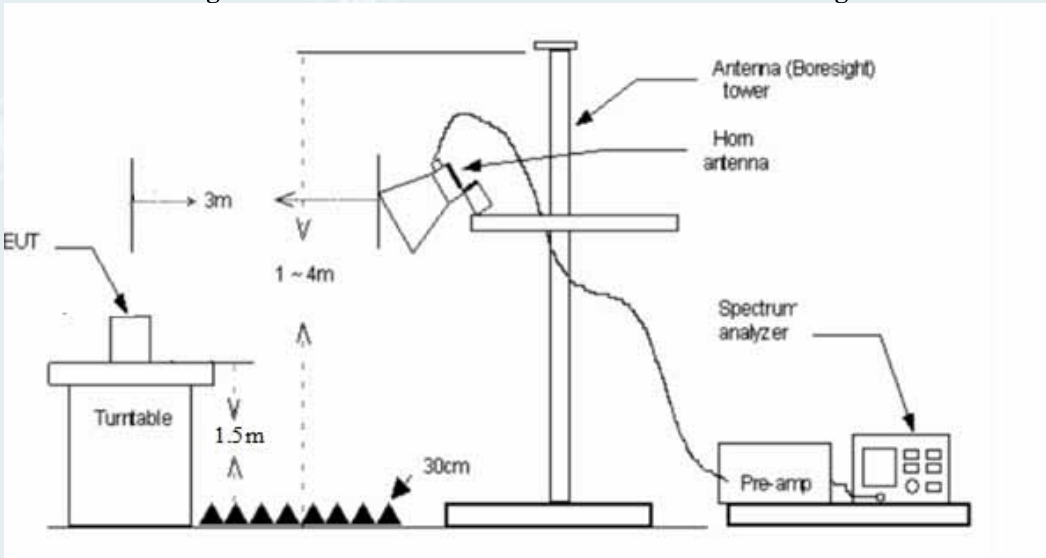


Figure 3. 1GHz-18GHz radiated emissions test configuration

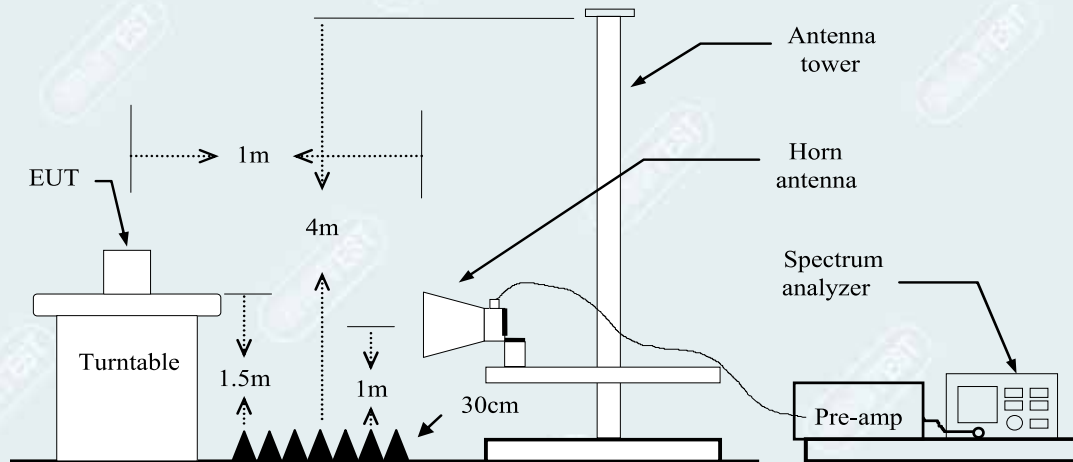


Figure 4. Above 18GHz radiated emissions test configuration

6.4. DATA SAMPLE

30MHz to 1GHz

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Pole
xxx	xxx	37.06	-15.48	21.58	40.00	-18.42	QP	Vertical

1GHz-18GHz

No.	Frequency (MHz)	Reading (dBuV/m)	Level (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Remark	Pole
xxx	xxx	49.66	53.43	3.77	74.00	20.57	peak	Vertical
xxx	xxx	34.98	38.75	3.77	54.00	15.25	AVG	Vertical

Above 18GHz

No.	Frequency (MHz)	Reading (dBuV/m)	Level (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Remark	Pole
xxx	xxx	59.22	58.58	-0.64	83.54	24.96	peak	Vertical
xxx	xxx	53.01	52.37	-0.64	63.54	11.17	AVG	Vertical

Frequency (MHz)

= Emission frequency in MHz

Ant.Pol. (H/V)

= Antenna polarization

Reading (dBuV)

= Uncorrected Analyzer / Receiver reading

Correction Factor (dB/m)

= Antenna factor + Cable loss – Amplifier gain

Result (dBuV/m)

= Reading (dBuV) + Correction Factor (dB/m)

Limit (dBuV/m)

= Limit stated in standard

Margin (dB)

= Remark Result (dBuV/m) – Limit (dBuV/m)

Peak

= Peak Reading

QP

= Quasi-peak Reading

AVG

= Average Reading

6.5. TEST RESULTS

Below 1GHz

All models were pretested and only the worst modes and channels were recorded in this report. (IEEE 802.11a 5180MHz-Ant 2)

Mode: Mode 1/ IEEE 802.11a-Ant 2

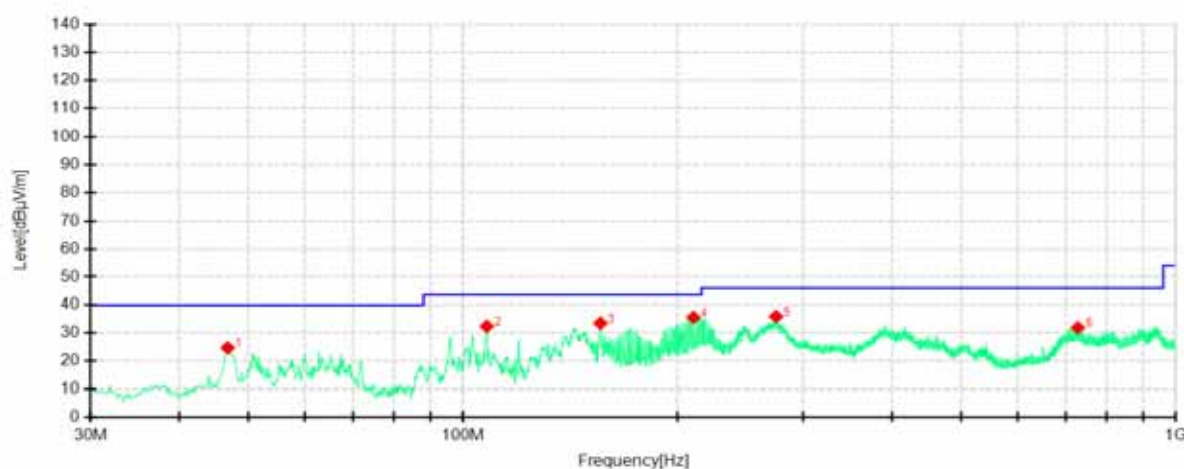
Temp. /Hum.:25°C/60%RH

Test Engineer: Lu Qiang

Channel :5180MHz

Power supply:AC120V/60Hz

Test Date: 2021-12-13



NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	46.7346	52.50	24.70	-27.80	40.00	15.30	100	321	Horizontal
2	107.9735	60.76	32.44	-28.32	43.50	11.06	100	225	Horizontal
3	155.8732	64.57	33.55	-31.02	43.50	9.95	150	55	Horizontal
4	210.4426	63.83	35.65	-28.18	43.50	7.85	100	184	Horizontal
5	274.8344	62.21	35.95	-26.26	46.00	10.05	200	150	Horizontal
6	728.7298	48.80	31.94	-16.86	46.00	14.06	100	205	Horizontal

Mode: Mode 1/ IEEE 802.11a-Ant 2

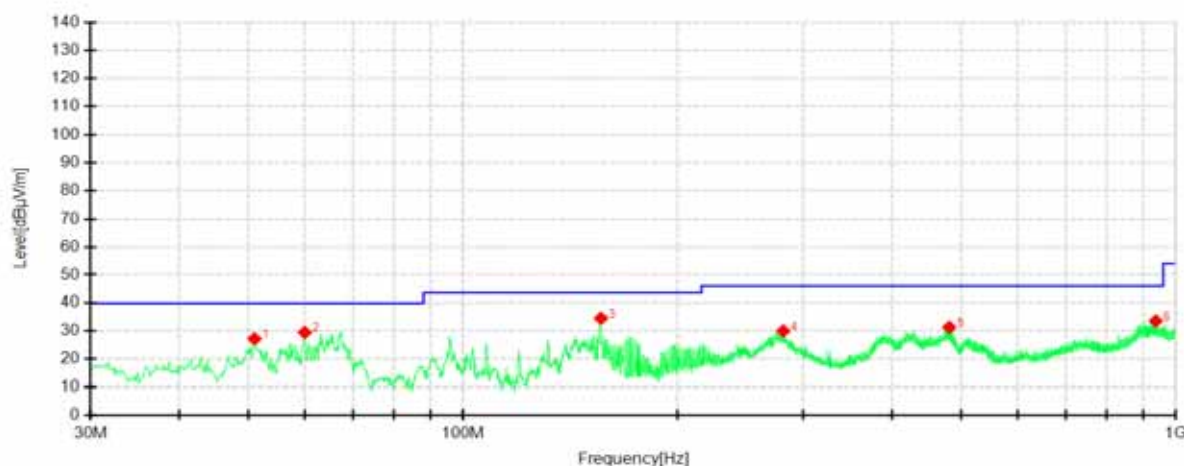
Temp. /Hum.:25°C/60%RH

Test Engineer: Lu Qiang

Channel :5180MHz

Power supply:AC120V/60Hz

Test Date: 2021-12-13



NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	50.9789	55.05	27.23	-27.82	40.00	12.77	100	271	Vertical
2	59.9525	58.79	29.52	-29.27	40.00	10.48	200	251	Vertical
3	156.1158	65.60	34.60	-31.00	43.50	8.90	200	162	Vertical
4	281.3827	56.09	30.03	-26.06	46.00	15.97	200	223	Vertical
5	480.8639	52.47	31.36	-21.11	46.00	14.64	300	39	Vertical
6	937.3059	47.37	33.64	-13.73	46.00	12.36	280	162	Vertical

Remark:

- 1 No emission found between lowest internal used/generated frequency to 30MHz.
- 2 Radiated emissions measured in frequency range from 9 kHz to 1GHz were made with an instrument using Quasi-peak detector mode.
- 3 Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of Receiver between 30MHz to 1GHz was 120 kHz.

Above 1GHz-18GHz

Pre-scan all modes and recorded the worst case results in this report (IEEE 802.11a / 802.11n HT20 / 802.11n HT40 / 802.11ac VHT80). For Radiated emission 1G~18GHz, the Ant 2 is the worst case for 802.11a SISO mode.

Mode: Mode 1/ IEEE 802.11a-Ant 2

Channel :5180MHz

Temp. /Hum.:25℃/60%RH

Power supply:AC120V/60Hz

Test Engineer: Lu Qiang

Test Date: 2021-12-09

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1001.8000	63.62	38.46	-25.16	74.00	35.54	150	174	Horizontal
2	1805.8000	66.79	44.75	-22.04	68.30	23.55	150	227	Horizontal
3	2700.4000	64.93	46.54	-18.39	74.00	27.46	150	150	Horizontal
4	3683.2000	59.19	44.23	-14.96	74.00	29.77	150	174	Horizontal
5	10359.4000	55.65	58.74	3.09	68.30	9.56	150	250	Horizontal
6	14016.9000	41.49	50.79	9.30	68.30	17.51	150	144	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1000.0000	64.85	39.69	-25.16	74.00	34.31	150	188	Vertical
2	1749.4000	67.83	45.39	-22.44	68.30	22.91	150	181	Vertical
3	2699.8000	62.62	44.23	-18.39	74.00	29.77	150	204	Vertical
4	8288.1000	51.76	50.05	-1.71	74.00	23.95	150	180	Vertical
5	10358.3000	52.68	55.78	3.10	68.30	12.52	150	188	Vertical
6	14021.3000	41.45	50.67	9.22	68.30	17.63	150	307	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	8288.0171	-1.71	46.05	44.34	54.00	9.66	200	132	Vertical

Mode: Mode 1/ IEEE 802.11a-Ant 2

Temp. /Hum.:25℃/60%RH

Test Engineer: Lu Qiang

Channel :5200MHz

Power supply:AC120V/60Hz

Test Date: 2021-12-09

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1008.4000	64.11	38.97	-25.14	74.00	35.03	150	137	Horizontal
2	1173.4000	65.70	41.14	-24.56	74.00	32.86	150	151	Horizontal
3	1742.2000	66.94	44.51	-22.43	68.30	23.79	150	221	Horizontal
4	2699.8000	64.35	45.96	-18.39	74.00	28.04	150	158	Horizontal
5	3685.6000	59.67	44.74	-14.93	74.00	29.26	150	186	Horizontal
6	10396.8000	56.98	59.79	2.81	68.30	8.51	150	186	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1003.6000	65.46	40.31	-25.15	74.00	33.69	150	185	Vertical
2	1750.0000	68.46	46.02	-22.44	68.30	22.28	150	192	Vertical
3	2699.8000	61.88	43.49	-18.39	74.00	30.51	150	212	Vertical
4	3689.2000	58.80	43.92	-14.88	74.00	30.08	150	74	Vertical
5	8320.0000	51.91	50.42	-1.49	74.00	23.58	150	179	Vertical
6	10400.1000	54.30	57.09	2.79	68.30	11.21	150	187	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	8320.0416	-1.49	46.15	44.66	54.00	9.34	200	133	Vertical

Mode: Mode 1/ IEEE 802.11a-Ant 2

Temp. /Hum.:25℃/60%RH

Test Engineer: Lu Qiang

Channel :5240MHz

Power supply:AC120V/60Hz

Test Date: 2021-12-09

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1165.6000	66.41	41.84	-24.57	74.00	32.16	150	144	Horizontal
2	1801.6000	65.32	43.27	-22.05	68.30	25.03	150	226	Horizontal
3	2699.8000	63.91	45.52	-18.39	74.00	28.48	150	157	Horizontal
4	3683.8000	59.13	44.18	-14.95	74.00	29.82	150	185	Horizontal
5	8900.8000	46.47	46.43	-0.04	68.30	21.87	150	66	Horizontal
6	10481.5000	58.44	61.98	3.54	68.30	6.32	150	210	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1214.8000	64.48	40.06	-24.42	74.00	33.94	150	222	Vertical
2	1742.2000	67.50	45.07	-22.43	68.30	23.23	150	186	Vertical
3	2700.4000	62.69	44.30	-18.39	74.00	29.70	150	215	Vertical
4	3687.4000	58.17	43.27	-14.90	74.00	30.73	150	69	Vertical
5	8383.8000	48.27	45.95	-2.32	74.00	28.05	150	160	Vertical
6	10479.3000	54.76	58.27	3.51	68.30	10.03	150	201	Vertical

Mode: Mode 1/ IEEE 802.11a-Ant 2

Temp. /Hum.:25°C/60%RH

Test Engineer: Lu Qiang

Channel :5745MHz

Power supply:AC120V/60Hz

Test Date: 2021-12-05

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1595.8000	70.10	47.19	-22.91	74.00	26.81	200	264	Horizontal
2	2397.4000	65.56	45.62	-19.94	68.30	22.68	100	258	Horizontal
3	2700.4000	63.41	45.02	-18.39	74.00	28.98	200	210	Horizontal
4	5910.4000	54.54	45.94	-8.60	68.30	22.36	100	0	Horizontal
5	11492.4000	49.75	54.87	5.12	74.00	19.13	200	174	Horizontal
6	17879.0000	32.55	49.41	16.86	74.00	24.59	100	138	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	11487.9754	5.12	38.58	43.70	54.00	10.30	106	111	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1598.8000	66.31	43.39	-22.92	74.00	30.61	200	212	Vertical
2	1742.2000	66.86	44.43	-22.43	68.30	23.87	200	184	Vertical
3	2699.8000	61.56	43.17	-18.39	74.00	30.83	200	212	Vertical
4	4996.0000	54.98	45.46	-9.52	74.00	28.54	100	291	Vertical
5	9192.3000	46.98	47.53	0.55	74.00	26.47	200	165	Vertical
6	11486.9000	54.83	59.87	5.04	74.00	14.13	200	199	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	11487.8764	5.04	38.15	43.19	54.00	10.81	178	127	Vertical