

Test Report

Verified code: 069053

Report No.: E202111252962-5-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 Part 2.1091 Radio frequency radiation exposure evaluation: mobile devices.

Test Result: Pass

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Approved by: Xiao Liang

GUANGZHOU GRG METROLOGY & TEST CO., LTD

Issued Date: 2022-03-29

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E202111252962-5	Original Issue	2022/02/23
2.0	E202111252962-5-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 E202111252962-5, and from the date of issuance of this report, the report which being replaced become invalid.

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1. GENERAL DESCRIPTION OF EUT

1.1. APPLICANT

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

1.2. MANUFACTURER

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

1.3. FACTORY

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

1.4. BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Hydrow Touchscreen Monitor
Model No.: CVC15101
Adding Model: /
Trade Name: Hydrow
FCC ID: 2A3HV-CVC15A
Power Supply: DC12V Power supplied by adapter
Model No: WT1205000
Adapter Specification: In put:100-240V~50/60Hz 1.6A
Out put:12V --- 5.0A
Frequency Range: BT&BLE:
2402-2480MHz
2.4G wifi:
2412MHz-2462MHz for 802.11b/g/n HT20
2422MHz-2452MHz: 802.11n HT40
5G wifi:
U-NII-1: 5150 MHz~5250 MHz
U-NII-3: 5725 MHz~5850 MHz

Transmit Power:

BLE:
GFSK for 1Mbps:2.54dBm
GFSK for 2Mbps:2.63 dBm
BT:
GFSK:6.30dBm
 $\pi/4$ -DQPSK:6.43dBm
8DPSK: 6.69dBm
2.4G wifi:
8.85dBm for 802.11b mode (antenna 1)
10.41dBm for 802.11b mode (antenna 2)
23.01dBm for 802.11g mode (antenna 1)
23.40dBm for 802.11g mode (antenna 2)
26.04dBm for 802.11n HT20 mode(MIMO)
25.64dBm for 802.11n HT40 mode(MIMO)
5G wifi:
U-NII-1:
14.57dBm for IEEE 802.11a (antenna 1)
15.06dBm for IEEE 802.11a (antenna 2)
17.25dBm for IEEE 802.11n HT20(MIMO)
16.08dBm for IEEE 802.11ac VHT20(MIMO)
17.12dBm for IEEE 802.11n HT40(MIMO)
15.15dBm for IEEE 802.11ac VHT40(MIMO)
15.30dBm for IEEE 802.11ac VHT80(MIMO)
U-NII-3:
14.76dBm for IEEE 802.11a (antenna 1)
14.84dBm for IEEE 802.11a (antenna 2)
17.38dBm for IEEE 802.11n HT20(MIMO)
16.88dBm for IEEE 802.11ac VHT20(MIMO)
17.78dBm for IEEE 802.11n HT40(MIMO)
16.84dBm for IEEE 802.11ac VHT40(MIMO)
16.76dBm for IEEE 802.11ac VHT80(MIMO)

Modulation type:

BLE:
GFSK for 1Mbps
GFSK for 2Mbps
BT:
FHSS
2.4G wifi:
DSSS for 802.11b mode;
OFDM for 802.11g/n mode
5G wifi:
OFDM for 802.11a/n/ac mode

Channel space:

BLE:2MHz
BT:1MHz
2.4G wifi:5MHz
5G wifi:
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

Antenna Specification: BLE&BT:
Internal antenna 3.5dBi gain (Max.)
2.4G wifi:
Internal antenna 1 with 3.5dBi gain (Max)
Internal antenna 2 with 3.5dBi gain (Max)
5G wifi:
U-NII-1:
Internal antenna 1 with 2.4dBi gain (Max.)
Internal antenna 2 with 2.1dBi gain (Max.)
U-NII-3:
Internal antenna 1 with 2.8dBi gain (Max.)
Internal antenna 2 with 3.3dBi gain (Max.)
Temperature Range:
-20℃~85℃
Hardware Version: V1.1
Software Version: V1.0
Sample No: E202111252962-0001,
E202111252962-0002,
Note: /

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2. LABORATORY AND ACCREDITATIONS

2.1. LABORATORY

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

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Tel : 0755-61180008

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2.2. ACCREDITATIONS

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

USA A2LA(Certificate #2861.01)

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>

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3. EVALUATION METHOD

Exposure category: General population/uncontrolled environment

EUT Type: Production Unit

Device Type: Mobile Device

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

4. LIMITS FOR GENERAL POPULATION/UNCONTROLLED EXPOSURE

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength(H) (A/m)	Power Density (S) (Mw/cm ²)	Averaging Time[E] ² , [H] ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100,000	/	/	1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

5. CALCULATION METHOD

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to anisotropic radiator

R=distance to the center of radiation of the antenna

From the EUT RF output power, the minimum mobile separation distance, $d=0.2\text{m}$, as well as the maximum gain of the used as following information, the RF power density can be obtained.

Frequency Band	Antenna type	Internal Identification		Maximum antenna gain
BT	Internal antenna	Antenna 1		3.5dBi
2.4GHz	Internal antenna	Antenna 1		3.5dBi
		Antenna 2		3.5dBi
5GHz	Internal antenna	Antenna 1	U-NII-1	2.4dBi
			U-NII-3	2.8dBi
		Antenna 2	U-NII-1	2.1dBi
			U-NII-3	3.3dBi

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6. ESTIMATION RESULT

6.1. CONDUCTED POWER RESULTS

2.4G wifi

Antenna	Mode	Frequency(MHz)	Peak Conducted Output Power (dBm)
Antenna 1	IEEE 802.11b	2412	8.85
		2437	8.32
		2462	7.24
	IEEE 802.11g	2412	22.75
		2437	22.72
		2462	23.01
	IEEE 802.11n HT20	2412	21.87
		2437	21.97
		2462	22.95
	IEEE 802.11n HT40	2422	20.36
		2437	21.98
		2452	22.25

Antenna	Mode	Frequency(MHz)	Peak Conducted Output Power (dBm)
Antenna 2	IEEE 802.11b	2412	10.41
		2437	9.62
		2462	8.56
	IEEE 802.11g	2412	23.12
		2437	22.86
		2462	23.40
	IEEE 802.11n HT20	2412	22.31
		2437	22.87
		2462	23.10
	IEEE 802.11n HT40	2422	21.59
		2437	22.65
		2452	22.98

5GHz WIFI

Test Mode	Band	Frequency (MHz)	AVG Conducted Output Power (dBm)	
			antenna 1	antenna 2
802.11a	U-NII-1	5180	14.57	15.01
		5200	14.15	14.86
		5240	14.24	15.06
	U-NII-3	5745	14.76	14.32
		5785	14.42	14.27
		5825	14.02	14.84
802.11n HT20	U-NII-1	5180	13.79	14.66
		5200	13.33	14.65
		5240	13.23	14.42
	U-NII-3	5745	13.73	14.60
		5785	13.29	15.14
		5825	13.69	14.96
IEEE 802.11ac VHT20	U-NII-1	5180	12.48	13.59
		5200	12.39	13.64
		5240	12.12	13.47
	U-NII-3	5745	13.02	14.57
		5785	12.58	14.36
		5825	12.31	14.02
802.11n HT40	U-NII-1	5190	13.62	14.55
		5230	11.29	12.53
	U-NII-3	5755	14.09	15.35
		5795	13.65	15.05
802.11ac VHT40	U-NII-1	5190	11.65	12.57
		5230	11.35	12.50
	U-NII-3	5755	13.08	14.47
		5795	12.67	14.14
802.11ac VHT80	U-NII-1	5210	11.20	13.16
	U-NII-3	5775	13.18	14.25

BLE

Antenna	Mode	Frequency(MHz)	Peak Conducted Output Power (dBm)
Antenna 1	1Mbps	2402	2.22
		2440	2.41
		2480	2.54
	2Mbps	2402	2.28
		2440	2.46
		2480	2.63

BT

Antenna	Mode	Frequency(MHz)	Peak Conducted Output Power (dBm)
Antenna 1	DH5	2402	6.11
		2441	6.30
		2480	6.27
	2DH5	2402	6.21
		2441	6.40
		2480	6.43
	3DH5	2402	6.49
		2441	6.69
		2480	6.62

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6.2. MANUFACTURING TOLERANCE

Frequency (MHz)	2.4G Wifi-Antenna 1					
	IEEE 802.11b	IEEE 802.11g	IEEE 802.11n HT20	IEEE 802.11n HT40	/	/
	2412	2462	2462	2452	/	/
Target (dBm)	8.0	23.0	22.0	22.0	/	/
Tolerance $\pm$ (dB)	1.0	1.0	1.0	1.0	/	/

Frequency (MHz)	2.4G Wifi-Antenna 2					
	IEEE 802.11b	IEEE 802.11g	IEEE 802.11n HT20	IEEE 802.11n HT40	/	/
	2412	2462	2462	2452	/	/
Target (dBm)	9.0	23.0	23.0	22.0	/	/
Tolerance $\pm$ (dB)	1.0	1.0	1.0	1.0	/	/

Frequency (MHz)	5G Wifi-Antenna 1			
	802.11a	802.11n HT20	802.11ac VHT20	802.11n HT40
	5745	5180	5745	5755
Target (dBm)	14.0	13.0	13.0	14.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0	1.0

Frequency (MHz)	5G Wifi-Antenna 2			
	802.11a	802.11n HT20	802.11ac VHT20	802.11n HT40
	5240	5785	5745	5755
Target (dBm)	15.0	15.0	14.0	15.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0	1.0

Frequency (MHz)	5G Wifi-Antenna 1		5G Wifi-Antenna 2	
	802.11ac VHT40	802.11ac VHT80	802.11ac VHT40	802.11ac VHT80
	5755	5775	5755	5775
Target (dBm)	13.0	13.0	14.0	14.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0	1.0

Frequency (MHz)	BLE-Antenna 1		
	1Mbps	2Mbps	/
	2480	2480	/
Target (dBm)	2.0	2.0	/
Tolerance $\pm$ (dB)	1.0	1.0	/

Frequency (MHz)	BT-Antenna 1		
	DH5	2DH5	3DH5
	2441	2480	2441
Target (dBm)	6.0	6.0	6.0
Tolerance ±(dB)	1.0	1.0	1.0

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6.3. MEASUREMENT RESULTS

6.3.1. STANDALONE MPE

2.4G wifi

Antenna 1

Mode	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	(dBm)	(mW)					
IEEE 802.11b	9.0	7.9433	3.5	2.2387	99.40%	0.0035	1.0000
IEEE 802.11g	24.0	251.1886	3.5	2.2387	96.50%	0.1119	1.0000
IEEE 802.11n HT20	23.0	199.5262	3.5	2.2387	96.27%	0.0889	1.0000
IEEE 802.11n HT40	23.0	199.5262	3.5	2.2387	91.43%	0.0889	1.0000

Antenna 2

Mode	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	(dBm)	(mW)					
IEEE 802.11b	10.0	10.0000	3.5	2.2387	99.40%	0.0045	1.0000
IEEE 802.11g	24.0	251.1886	3.5	2.2387	96.50%	0.1119	1.0000
IEEE 802.11n HT20	24.0	251.1886	3.5	2.2387	96.27%	0.1119	1.0000
IEEE 802.11n HT40	23.0	199.5262	3.5	2.2387	91.43%	0.0889	1.0000

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5G wifi**Antenna 1**

Mode	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	(dBm)	(mW)					
IEEE 802.11a	15.0	31.6228	2.8	1.9055	96.53%	0.0120	1.0000
IEEE 802.11n HT20	14.0	25.1189	2.8	1.9055	96.27%	0.0095	1.0000
IEEE 802.11n HT40	15.0	31.6228	2.8	1.9055	92.86%	0.0120	1.0000
IEEE 802.11ac VHT20	14.0	25.1189	2.8	1.9055	96.30%	0.0095	1.0000
IEEE 802.11ac VHT40	14.0	25.1189	2.8	1.9055	92.86%	0.0095	1.0000
IEEE 802.11ac VHT80	14.0	25.1189	2.8	1.9055	86.49%	0.0095	1.0000

Antenna 2

Mode	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	(dBm)	(mW)					
IEEE 802.11a	16.0	39.8107	3.3	2.1380	96.53%	0.0169	1.0000
IEEE 802.11n HT20	16.0	39.8107	3.3	2.1380	96.27%	0.0169	1.0000
IEEE 802.11n HT40	16.0	39.8107	3.3	2.1380	92.86%	0.0169	1.0000
IEEE 802.11ac VHT20	15.0	31.6228	3.3	2.1380	96.30%	0.0135	1.0000
IEEE 802.11ac VHT40	15.0	31.6228	3.3	2.1380	92.86%	0.0135	1.0000
IEEE 802.11ac VHT80	15.0	31.6228	3.3	2.1380	86.49%	0.0135	1.0000

BT**Antenna 1**

Mode	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	(dBm)	(mW)					
DH5	7.0	5.0119	3.5	2.2387	57.55%	0.0022	1.0000
2DH5	7.0	5.0119	3.5	2.2387	57.75%	0.0022	1.0000
3DH5	7.0	5.0119	3.5	2.2387	57.75%	0.0022	1.0000

Remark: 1. Maximum average power including tune-up tolerance;

2. MPE use distance is 20cm from manufacturer declaration of user manual.

Antenna 1 and Antenna 2 for 2.4G WLAN and 5G RLAN

Band	Mode	MPE Ratio (mW/cm ²) Antenna 1	MPE Ratio (mW/cm ²) Antenna 2	ΣMPE Ratios (mW/cm ²)	Limit (mW/cm ²)	Results
2.4G	IEEE 802.11b	0.0035	0.0045	/	1.000	Pass
	IEEE 802.11g	0.1119	0.1119	/	1.000	Pass
	IEEE 802.11n HT20	0.0889	0.1119	0.2008	1.000	Pass
	IEEE 802.11n HT40	0.0889	0.0889	0.1778	1.000	Pass

Band	Mode	MPE Ratio (mW/cm ²) Antenna 1	MPE Ratio (mW/cm ²) Antenna 2	ΣMPE Ratios (mW/cm ²)	Limit (mW/cm ²)	Results
5G	IEEE 802.11a	0.0120	0.0169	/	1.000	Pass
	IEEE 802.11n HT20	0.0095	0.0169	0.0264	1.000	Pass
	IEEE 802.11n HT40	0.0120	0.0169	0.0289	1.000	Pass
	IEEE 802.11ac VHT20	0.0095	0.0135	0.0230	1.000	Pass
	IEEE 802.11ac VHT40	0.0095	0.0135	0.0230	1.000	Pass
	IEEE 802.11ac VHT80	0.0095	0.0135	0.0230	1.000	Pass

Remark:

1. Maximum average power including tune-up tolerance;
2. MPE use distance is 20cm from manufacturer declaration of user manual.

We first evaluate WLAN simultaneous transmission and later evaluate WLAN simultaneous transmission;

Maximum Simultaneous transmission MPE Ratio for WLAN and BT

Maximum MPE ratio (mW/cm ²) 2.4G	Maximum MPE ratio (mW/cm ²) BT	Σ MPE ratios (mW/cm ²)	Limit (mW/cm ²)	Results
0.2008	0.0022	0.2030	1.000	Pass

Note: The estimation distance is 20cm

7. CONCLUSION

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

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