RADIO TEST REPORT

Report No: STS2112348H02

Issued for

Orbit Irrigation Products Inc

845 Overland Road, North Salt Lake, Utah 84054 USA

Product Name:	High Station Count Controller
Brand Name:	b-hyve / HYDRO RAIN
Model Name:	HSC-1600-M
Series Model:	HSC-6300-D
FCC ID:	ML6HSC
Test Standard:	FCC 47CFR §2.1091

Shenzhen STS Test Services Co., Ltd.
A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ,
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TEL: +86-755 3688 6288 FAX: +86-755 3688 6277 E-mail:sts@stsapp.com

Test Report Certification

Applicant's Name	:	Orbit Irrigation Products Inc
Address	:	845 Overland Road, North Salt Lake, Utah 84054 USA
Manufacturer's Name	:	Orbit Irrigation Products Inc
Address	:	845 Overland Road, North Salt Lake, Utah 84054 USA
Product Description		
Product Name	:	High Station Count Controller
Brand Name	:	b-hyve / HYDRO RAIN
Model Name	:	HSC-1600-M
Series Model	:	HSC-6300-D
Standards	:	FCC 47CFR §2.1091

Date of Test	:	
Date of receipt of test item	:	14 Jan. 2022
Date (s) of performance of tests	:	14 Jan. 2022 ~ 24 Feb. 2022
Date of Issue	:	24 Feb. 2022
Test Result	:	**Pass**

Testing Engineer : Chris Chen

(Chris Chen)

Technical Manager : Sean She

(Sean she)

Authorized Signatory : Vita Li

(Vita Li)

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Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	24 Feb. 2022	STS2112348H02	ALL	Initial Issue

1. GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF THE EUT

<table>
<tr><td>Product Name</td><td>High Station Count Controller</td></tr>
<tr><td>Brand Name</td><td>b-hyve / HYDRO RAIN</td></tr>
<tr><td>Model Name</td><td>HSC-1600-M</td></tr>
<tr><td>Series Model</td><td>HSC-6300-D</td></tr>
<tr><td>Model Difference</td><td>
<table>
<tr><td>Model Names</td><td>Series Model</td><td></td></tr>
<tr><td>HSC-1600-M</td><td>04550</td><td>16-Station Modular Based Controller</td></tr>
<tr><td>HSC-6300-D</td><td>04554</td><td>Two Wire Controller</td></tr>
</table>
Both HSC-1600-M and HSC-6300-D are High Station Count Controllers that share the same main board hardware. Only the irrigation station system used is different.

The HSC-1600-M “Multi Wire” systems utilize a dedicated wire to each valve and shared common return wires. By default there is 2 of the 8 station modules, with option to expand with a total of up to 6 of the 8 station modules attached that provides for control of 48 total zones. We allow up to 4 of these zones to be active at a time.

The HSC-6300-D “Two Wire” systems utilize a digital addressing to separately control up to 63 unique decoders on a set of two wires. We allow up to 4 of these zones to be active at a time.</td></tr>
<tr><td>Product Description</td><td>The EUT is High Station Count Controller
<table>
<tr><td>Operation Frequency:</td><td>BLE: 2402~2480 MHz
2.4G WLAN: 802.11b/g/n 20: 2412~2462 MHz
5G WLAN:
IEEE 802.11a/n(HT20)/ac(VHT20): 5.180GHz-5.240GHz
IEEE 802.11n(HT40)/ac(VHT40): 5.190GHz-5.230GHz
IEEE 802.11ac(VHT80): 5.210GHz
LPWAN:
Uplink: 902.3~914.9MHz
Downlink: 923.3~926.9MHz</td></tr>
</table>
</td></tr>
</table>

	Modulation Type:	BLE: GFSK 2.4G WLAN: 802.11b(DSSS):CCK,DQPSK,DBPSK 802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM 5G WLAN: 802.11a(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11ac(OFDM): BPSK,QPSK,16-QAM,64-QAM,256-QAM LPWAN: GFSK
	Antenna gain:	BLE: 2.2dBi 2.4G WLAN: 2.2dBi 5G WLAN: -0.15dBi LPWAN: 1.7dBi
	Antenna Designation:	PCB Antenna
Power Rating	Input: 110/208V~ 50/60Hz 0.76A 90VA or 230/240V~ 50/60Hz 0.38A 92VA Output: 24VAC, 2.5Amps	
Hardware Version	003	
Software Version	V28	

1.2 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD
Add. : A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01

2. FCC 47CFR §2.1091 REQUIREMENT

2.1 TEST STANDARDS

The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The gain of the antennas used in the product is extracted from the Antenna data sheets provided and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.
Although the Friis Transmission formula is far field assumption, the calculated result of that is an over-prediction for near field power density. It is taken as worst case to specify the safety range.

2.2 LIMIT

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of the human exposure to radio-frequency (RF) radiation as specified in 1.1307 (b)

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)
Limits for Occupational / controlled Exposures			
300 - 1500	--	--	F/300
1500 – 100000	--	--	5.0
Limits for General population / Uncontrolled Exposure			
300 - 1500	--	--	F/1500
1500 – 100000	--	--	1.0

F= Frequency in MHz

Friss Formula

Friss Transmission Formula: $Pd = (Pout * G) / (4*pi*r^2)$

Where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = Distance between observation point and the center of radiator in cm

If we know the maximum gain of the antenna and the total output power to the antenna, through calculation, we will know MPE value at distance 20cm.

2.3 EUT OPERATION CONDITION

EUT was enabled to transmit and receive at lowest, middle and highest channels.

2.4 CLASSIFICATION

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance from the antenna should be included in the User manual. So, this device is classified as Mobile device.

2.5 TEST RESULT

Turn up

Mode	Detector	Turn up Power
BLE	AV	0±1dBm
2.4G WLAN	AV	8±1dBm
5G WLAN	AV	9±1dBm
LPWAN	AV	10±1dBm

ANT Gain (G)

BLE/2.4G WLAN: 2.2dBi (gain of antenna in linear scale=1.66)

5G WLAN: -0.15dBi (gain of antenna in linear scale=0.97)

LORA: 1.7dBi (gain of antenna in linear scale=1.49)

Protocol	**Max Turn up Power (dBm)**	**Max Turn up Power (mW)**	**ANT Gain(gain of antenna in linear scale)**	**Power Density (mW/cm²)**	**Limit (mW/cm²)**	**Ratio**	**Result**
BLE	1	1.26	1.66	0.0004	1	0.0004	Pass
2.4G WLAN	9	7.94	1.66	0.0026	1	0.0026	Pass
5G WLAN	10	10	0.97	0.0019	1	0.0019	Pass
LPWAN	11	12.59	1.49	0.0037	0.618	0.006	Pass

Multiple transmission:

BLE+ LPWAN =0.0004+0.006=0.0064＜1

WLAN+ LPWAN =0.0026+0.006=0.0086＜1

Note: The Bluetooth and WLAN can’t simultaneous transmission at the same time.

※※※※※END OF THE REPORT※※※※※