Shenzhen Huaxia Testing Technology Co., Ltd

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Telephone: +86-755-26648640
Fax: +86-755-26648637
Website: www.cqa-cert.com

Report Template Version: V03
Report Template Revision Date: Mar.1st, 2017

RF Exposure Evaluation Report

Report No. :	CQASZ20201101383E-03
Applicant:	Royal Hydroponics LLC
Address of Applicant:	121 Leavitt Road Suite 148 Amherst, OH 44001
Manufacturer:	MOKO TECHNOLOGY LIMITED
Address of Manufacturer:	2F, Building1,No.37 Xiaxintang Xintang village, Fucheng Street, Longhua District， Shenzhen,Guangdong Province, China
Factory:	MOKO TECHNOLOGY LIMITED
Address of Factory:	2F, Building1,No.37 Xiaxintang Xintang village, Fucheng Street, Longhua District， Shenzhen,Guangdong Province, China

Equipment Under Test (EUT):

Product:	HydroMesh Smart Plug
Model No.:	HSP110
Brand Name:	by Royal Hydroponics
FCC ID:	2AX9I-HSP110
Standards:	47 CFR Part 1.1307 47 CFR Part 1.1310 KDB447498D01 General RF Exposure Guidance v06
Date of Test:	2020-02-17 to 2020-02-28
Date of Issue:	2020-11-20
Test Result :	**PASS***

Tested By： Tom Chen.

(Tom chen)

Reviewed By: Ares Liu

(Ares Liu)

Approved By: Sheek Luo

(Sheek Luo)

SHENZHEN HUAXIA TESTING TECHNOLOGY CO.,LTD 华夏准测 APPROVED

* In the configuration tested, the EUT complied with the standards specified above.

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20200200089E-03	Rev.01	Initial report	2020-03-02
CQASZ20201101383E-03	Rev.02	For specific changes, please refer to the notes below	2020-11-20

Note:

	Before change	After change
Item number	CQASZ20200200089E-03	CQASZ20201101383E-03
Applicant:	MOKO TECHNOLOGY LIMITED	Royal Hydroponics LLC
Address of Applicant:	2F, Building1,No.37 Xiaxintang Xintang village, Fucheng Street, Longhua District，Shenzhen,Guangdong Province, China	121 Leavitt Road Suite 148 Amherst, OH 44001
EUT Name:	Bluetooth Gateway Plug Mini	HydroMesh Smart Plug
Model No.	MK110	HSP110
Brand Name:	N/A	by Royal Hydroponics

This test report (Ref. No.: CQASZ20201101383E-03) All test data comes from source test reports (Ref. No.: CQASZ20200200089E-03). Only on the basis of the original report change Applicant and Address of Applicant. The tested samples have not been changed, it's just a different model name.

2 Contents

3 General Information

3.1 Client Information

Applicant:	Royal Hydroponics LLC
Address of Applicant:	121 Leavitt Road Suite 148 Amherst, OH 44001
Manufacturer:	MOKO TECHNOLOGY LIMITED
Address of Manufacturer:	2F, Building1,No.37 Xiaxintang Xintang village, Fucheng Street, Longhua District，Shenzhen,Guangdong Province, China

3.2 General Description of EUT

Product Name:	HydroMesh Smart Plug
Model No.:	HSP110
Trade Mark:	by Royal Hydroponics
Type of Modulation:	EEE 802.11b mode: DSSS(CCK,QPSK, BPSK) IEEE 802.11g mode: OFDM (BPSK/QPSK/16QAM/64QAM) IEEE 802.11n HT20 MHz mode: OFDM (BPSK/QPSK/16QAM/64QAM) IEEE 802.11n HT40 MHz mode: OFDM (BPSK/QPSK/16QAM/64QAM) BLE(GFSK)
Channel Spacing:	IEEE 802.11b/g/n(HT20):20MHz IEEE 802.11n(HT40):40MHz BLE:2MHz
Operation Frequency:	IEEE 802.11b;IEEE 802.11g;IEEE 802.11n HT20

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	6	2437	11	2462
2	2417	7	2442		
3	2422	8	2447		
4	2427	9	2452		
5	2432	10	2457		

IEEE 802.11n HT40

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2422	4	2437	7	2452
2	2427	5	2442		
3	2432	6	2447		

BLE

<table>
<tr><td></td><td>
<table>
<tr><th>Channel No.</th><th>Frequency (MHz)</th><th>Channel No.</th><th>Frequency (MHz)</th></tr>
<tr><td>1</td><td>2402</td><td>2</td><td>2404</td></tr>
<tr><td>3</td><td>2406</td><td>4</td><td>2408</td></tr>
<tr><td>5</td><td>2410</td><td>6</td><td>2412</td></tr>
<tr><td>7</td><td>2414</td><td>8</td><td>2416</td></tr>
<tr><td>9</td><td>2418</td><td>10</td><td>2420</td></tr>
<tr><td>11</td><td>2422</td><td>12</td><td>2424</td></tr>
<tr><td>13</td><td>2426</td><td>14</td><td>2428</td></tr>
<tr><td>15</td><td>2430</td><td>16</td><td>2432</td></tr>
<tr><td>17</td><td>2434</td><td>18</td><td>2436</td></tr>
<tr><td>19</td><td>2438</td><td>20</td><td>2440</td></tr>
<tr><td>21</td><td>2442</td><td>22</td><td>2444</td></tr>
<tr><td>23</td><td>2446</td><td>24</td><td>2448</td></tr>
<tr><td>25</td><td>2450</td><td>26</td><td>2452</td></tr>
<tr><td>27</td><td>2454</td><td>28</td><td>2456</td></tr>
<tr><td>29</td><td>2458</td><td>30</td><td>2460</td></tr>
<tr><td>31</td><td>2462</td><td>32</td><td>2464</td></tr>
<tr><td>33</td><td>2466</td><td>34</td><td>2468</td></tr>
<tr><td>35</td><td>2470</td><td>36</td><td>2472</td></tr>
<tr><td>37</td><td>2474</td><td>38</td><td>2476</td></tr>
<tr><td>39</td><td>2478</td><td>40</td><td>2480</td></tr>
</table>
</td></tr>
<tr><td>Antenna Type:</td><td>PCB antenna</td></tr>
<tr><td>Antenna:</td><td>0 dBi gain</td></tr>
<tr><td>Power Supply:</td><td>AC 120V/60Hz</td></tr>
</table>

4 SAR Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	30
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: Pd = (Pout*G)/(4* Pi * R 2)

Where

Pd = power density in mW/cm2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

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

Pd id the limit of MPE, 1 mW/cm2 . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.1.3 EUT RF Exposure

1) For BLE

Measurement Data

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	2.04	2.0±1	3	1.995
Middle(2440MHz)	3.01	3.0±1	4	2.512
Highest(2480MHz)	4.52	4.0±1	5	3.162

The worst case:

Maximum tune-up Power (mW)	**Antenna Gain (dBi)**	**Power Density at R = 20 cm (mW/cm^2)**	**Limit**	**Result**
3.162	0	0.00063	1.0	PASS

Remark: The Max Conducted Peak Output Power data refer to report Report No.: CQASZ20201101383E-02

2) For WIFI

Measurement Data

IEEE for 802.11b mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	13.72	13.5±1	14.5	28.184
Middle(2437MHz)	13.85	13.5±1	14.5	28.184
Highest(2462MHz)	13.16	13.5±1	14.5	28.184
IEEE for 802.11g mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	10.81	10.5±1	11.5	14.125
Middle(2437MHz)	10.12	10.5±1	11.5	14.125
Highest(2462MHz)	10.46	10.5±1	11.5	14.125
IEEE for 802.11n(HT20) mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	9.63	10.0±1	11	12.589
Middle(2437MHz)	9.83	10.0±1	11	12.589
Highest(2462MHz)	9.76	10.0±1	11	12.589
IEEE for 802.11n(HT40) mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2422MHz)	6.71	7.0±1	8	6.310
Middle(2437MHz)	7.42	7.0±1	8	6.310
Highest(2452MHz)	7.60	7.0±1	8	6.310

The worst case:

Maximum tune-up Power (mW)	**Antenna Gain (dBi)**	**Power Density at R = 20 cm (mW/cm^2)**	**Limit**	**Result**
28.184	0	0.006	1.0	PASS

Remark: The Max Conducted Average Output Power data refer to report Report No.: CQASZ20201101383E-01

WIFI and BLE can not simultaneous transmitting at same time.