

## TEST REPORT

### FCC Rules Part 15.231

**Report Reference No.**.....: **MTWG2207145-H**

**FCC ID**..... : **2A33F-OPA-1**

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Date of issue.....: **Aug.11, 2022**

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**Applicant's name**.....: **TrolMaster Agro Instruments Co., Ltd**

Address .....: Room 02-03, 25/F, Well Tech Centre, 9 Pat Tat Street,  
San Po Kong, Kowloon, Hong Kong.

**Test specification/ Standard** .....: **47 CFR Part 1.1307**

**47 CFR Part 2.1093**

TRF Originator.....: Shenzhen Most Technology Service Co., Ltd.

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**Test item description** .....: Smart Junction Box / Smart Junction Box (480V version)

Trade Mark .....: **TrolMaster**

Model/Type reference.....: OPA-1

Listed Models .....: OPB-1

Modulation Type.....: LORA

Operation Frequency.....: 915MHz

Hardware version .....: V1.0

Software version .....: V0.5

Rating .....: AC100~480V,50/60Hz

Result.....: **PASS**

## TEST REPORT

Equipment under Test : Smart Junction Box / Smart Junction Box (480V version)

Model /Type : OPA-1

Listed Models : OPB-1

Remark: The internal circuit is the same, only the output voltage is different.

Applicant : TrolMaster Agro Instruments Co., Ltd

Address : Room 02-03, 25/F, Well Tech Centre, 9 Pat Tat Street,  
San Po Kong, Kowloon, Hong Kong

Manufacturer : TrolMaster Agro Instruments Co., Ltd

Address : Room 02-03, 25/F, Well Tech Centre, 9 Pat Tat Street,  
San Po Kong, Kowloon, Hong Kong

Factory 1 : TOPE (XIAMEN) ELECTRONICS CO.,LTD  
No.98-2, North Xinglin 2nd Road, Jimer District, XIAMEN, Fujian  
361022

Factory 2 : Alder Optomechanical Corp.  
No. 171 Tianjin Street, Pingzhen Dist. Taoyuan 32458, Taiwan

Factory 3 : Amber Horticultural Technology Ltd.  
No.39, Daji Rende Dist, Tainan City, 717007, Taiwan

<b>Test Result:</b>	<b>PASS</b>
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

**Contents****1. Revision History**

Revision	Issue Date	Revisions	Revised By
00	2022.08.11	Initial Issue	Alisa Luo

## 2. SAR Evaluation

### 2.1 RF Exposure Compliance Requirement

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 <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3–3.0 .....	614	1.63	*(100)	6
3.0–30 .....	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30–300 .....	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3–1.34 .....	614	1.63	*(100)	30
1.34–30 .....	824/f	2.19/f	*(180/f <sup>2</sup> )	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:  $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$  Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = 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

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. 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.

### 2.1.3 EUT RF Exposure

$$\text{EIRP} = \text{PT} * \text{GT} = (\text{E} \times \text{D})^2 / 30$$

where:

PT = transmitter output power in watts,

GT = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m,  $10^{(\text{dB}\mu\text{V}/\text{m})/20} / 10^6$ ,

D = measurement distance in meters (m)---3m,

$$\text{So PT} = (\text{E} \times \text{D})^2 / 30 / \text{GT}$$

The worst case (refer to report MTWG2207120s below:

Antenna polarization: Horizontal		
Frequency (MHz)	Level (dBuV/m)	Polarization
915.0	77.85	Peak
915.0	65.84	Average

Antenna polarization: Vertical		
Frequency (MHz)	Level (dBuV/m)	Polarization
915.0	78.46	Peak
915.0	66.13	Average

For 915.0MHz wireless:

Field strength=66.13 dBuV/m

Ant gain:3dBi;so Ant numeric gain=2

$$\text{EIRP} = \text{PT} * \text{GT} = (\text{E} \times \text{D})^2 / 30 = (10^{(\text{dB}\mu\text{V}/\text{m})/20} / 10^6 * 3)^2 / 30 = 0.0000012$$

$$\text{So PT} = \text{EIRP} / \text{GT} = 0.0000006\text{W} = 0.0006\text{mW}$$

$$\text{So Pd} = (\text{Pout} * \text{G}) / (4 * \text{Pi} * \text{R}^2) = (0.0006 * 2) / (4 * 3.1416 * 20^2) = 0.0000002$$

$$\text{exclusion} = 0.0000002 < 0.61$$

So the SAR report is not required.