

TEST REPORT

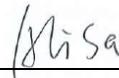
FCC Rules Part 15.231

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

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

Compiled by

(position+printed name+signature) ..: File administrators Alisa Luo



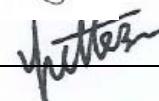
Supervised by

(position+printed name+signature) ..: Test Engineer Sunny Deng



Approved by

(position+printed name+signature) ..: Manager Yvette Zhou



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

Representative Laboratory Name ..: **Shenzhen Most Technology Service Co., Ltd.**

Address: No.5, 2nd Langshan Road, North District, Hi-tech Industrial Park,
Nanshan, Shenzhen, Guangdong, China.

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

| | |
|---------------------|-------------|
| Test Result: | PASS |
|---------------------|-------------|

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 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: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$ Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d is 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.

2.1.3 EUT RF Exposure

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

where:

PT = transmitter output power in watts,
 GT = numeric gain of the transmitting antenna (unitless),
 E = electric field strength in V/m, $10^{(\text{dBuV/m}/20)/20} / 10^6$,
 D = measurement distance in meters (m)---3m,
 So $\text{PT} = (E \times D)^2 / 30 / \text{GT}$

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

$$\text{EIRP} = \text{PT} \times \text{GT} = (E \times D)^2 / 30 = (10^{(\text{dBuV/m}/20)/20} / 10^6)^2 / 30 = 0.00000012$$

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

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

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

So the SAR report is not required.