

# 1 Cover Page

## RF MPE REPORT

**Application No.:** SHCR2201000015AT  
**FCC ID:** UCZ-W452AS-Z1  
**IC :** 8575A-W452ASZ1  
**Applicant:** LOREX Technology Inc.  
**Address of Applicant:** 250 Royal crest Court, Markham, L3R 3S1 Canada  
**Manufacturer:** LOREX Technology Inc.  
**Address of Manufacturer:** 250 Royal crest Court, Markham, L3R 3S1 Canada

### Equipment Under Test (EUT):

**EUT Name:** 2K Outdoor Floodlight Camera  
**Model No.:** W452AS-Z  
**HVIN:** W452AS-Z1  
**FCC Rules** 47 CFR §2.1091  
**Standard(s) :** KDB447498 D01 General RF Exposure Guidance v06  
 RSS-102 Issue 5 Amendment 1 (February 2, 2021)  
**Date of Receipt:** 2021-11-30  
**Date of Test:** 2022-01-04 to 2022-01-17  
**Date of Issue:** 2022-01-17

|                     |              |
|---------------------|--------------|
| <b>Test Result:</b> | <b>Pass*</b> |
|---------------------|--------------|

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

Parlam Zhan

Parlam Zhan  
Laboratory Manager



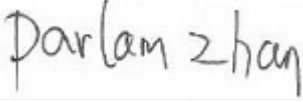
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| Revision Record |             |            |        |
|-----------------|-------------|------------|--------|
| Version         | Description | Date       | Remark |
| 00              | Original    | 2022-01-17 | /      |
|                 |             |            |        |
|                 |             |            |        |

|                          |  |                                                                                    |  |
|--------------------------|--|------------------------------------------------------------------------------------|--|
| Authorized for issue by: |  |                                                                                    |  |
|                          |  |  |  |
|                          |  | Micheal Niu / Project Engineer                                                     |  |
|                          |  |  |  |
|                          |  | Parlam Zhan / Reviewer                                                             |  |



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### 3 General Information

#### 3.1 General Description of E.U.T.

|                   |                      |
|-------------------|----------------------|
| Power supply:     | DC 12V/1A by adapter |
| S/N:              | ND022011094206       |
| Firmware Version: | V2.8                 |

#### 3.2 Technical Specifications

##### 2.4GHz

|                      |                                                                                                                   |
|----------------------|-------------------------------------------------------------------------------------------------------------------|
| Antenna Gain:        | Ant 1:4.80dBi (Provided by manufacturer)<br>Ant 2:4.34dBi (Provided by manufacturer)<br>Directional Gain: 7.58dBi |
| Antenna Type:        | Antenna 1: PCB Antenna<br>Antenna 2: PCB Antenna                                                                  |
| Channel Spacing:     | 5MHz                                                                                                              |
| Data Rate:           | 802.11b: 1/2/5.5/11Mbps,<br>802.11g: 6/9/12/18/24/36/48/54Mbps<br>802.11n: MCS 0 to 7 for HT20MHz                 |
| Modulation Type:     | 802.11b: DSSS (CCK, DQPSK, DBPSK)<br>802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)                                   |
| Number of Channels:  | 802.11b/g/n(HT20):11                                                                                              |
| Operation Frequency: | 802.11b/g/n(HT20): 2412MHz to 2462MHz                                                                             |

##### 5G:

|                      | Band                                                                                                                                      | Mode                      | Frequency Range(MHz) | Number of channels |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------|--------------------|
| Operation Frequency: | UNII Band I                                                                                                                               | 802.11a/n(HT20)/ac(VHT20) | 5180-5240            | 4                  |
|                      |                                                                                                                                           | 802.11n(HT40)/ac(VHT40)   | 5190-5230            | 2                  |
|                      |                                                                                                                                           | 802.11ac(VHT80)           | 5210                 | 1                  |
|                      | UNII Band II-A                                                                                                                            | 802.11a/n(HT20)/ac(VHT20) | 5260-5320            | 4                  |
|                      |                                                                                                                                           | 802.11n(HT40)/ac(VHT40)   | 5270-5310            | 2                  |
|                      |                                                                                                                                           | 802.11ac(VHT80)           | 5290                 | 1                  |
|                      | UNII Band II-C                                                                                                                            | 802.11a/n(HT20)/ac(VHT20) | 5500-5700            | 11                 |
|                      |                                                                                                                                           | 802.11n(HT40)/ac(VHT40)   | 5510-5670            | 5                  |
|                      |                                                                                                                                           | 802.11ac(VHT80)           | 5530~5610            | 2                  |
|                      | UNII Band III                                                                                                                             | 802.11a/n(HT20)/ac(VHT20) | 5745-5825            | 5                  |
|                      |                                                                                                                                           | 802.11n(HT40)/ac(VHT40)   | 5755-5795            | 2                  |
|                      |                                                                                                                                           | 802.11ac(VHT80)           | 5775                 | 1                  |
| Modulation Type:     | 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)<br>802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) |                           |                      |                    |
| Channel Spacing:     | 802.11a/n(HT20)/ac(VHT20): 20MHz<br>802.11n(HT40)/ac(VHT40): 40MHz<br>802.11ac(VHT80): 80MHz                                              |                           |                      |                    |
| Data Rate:           | 802.11a: 6/9/12/18/24/36/48/54Mbps                                                                                                        |                           |                      |                    |



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|               |                                                                                                                            |
|---------------|----------------------------------------------------------------------------------------------------------------------------|
|               | 802.11n: MCS0-15<br>802.11ac: MCS0-9                                                                                       |
| Antenna Gain: | Antenna 1:3.48dBi; (Provided by manufacturer)<br>Antenna 2:2.39dBi; (Provided by manufacturer)<br>Directional Gain:5.96dBi |
| Antenna Type: | Antenna 1: PCB Antenna<br>Antenna 2: PCB Antenna                                                                           |

Remark: For frequencies falling between 5150-5250 and 5600-5650MHz will not be used in Canada.



### 3.3 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

### 3.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **CNAS (No. CNAS L4354)**

CNAS has accredited Compliance Certification Services (Kunshan) Inc. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 2541.01)**

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

• **FCC (Designation Number: CN1172)**

Compliance Certification Services Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

• **ISED (CAB identifier: CN0072)**

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

Company Number: 2324E

• **VCCI (Member No.: 1938)**

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.



## 4 Test Standards and Limits

### 4.1 FCC Radiofrequency radiation exposure limits:

According to §1.1310, the limit for general population/uncontrolled exposures

| Frequency     | Power density(mW/cm <sup>2</sup> ) | Averaging time(minutes) |
|---------------|------------------------------------|-------------------------|
| 300MHz~1.5GHz | $f/1500$                           | 30                      |
| 1.5GHz~100GHz | 1.0                                | 30                      |

### 4.2 IC Radiofrequency radiation exposure limits:

According to RSS-102 section 2.5.2, RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);

- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $4.49/f^{0.5}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

For 2.4G device, the limit of worse case is 2.68 W

For 5G device, the limit of worse case is 4.53W



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## 5 Measurement and Calculation

### 5.1 Maximum transmit power

The Power Data is based on the RF Test Report SHCR220100001501-2.4GHz

| Test Mode | Channel | Antenna 1 Power[dBm] | Antenna 2 Power[dBm] | MIMO Power[dBm] | Antenna 1 Power[mW] | Antenna 2 Power[mW] | MIMO Power[mW] |
|-----------|---------|----------------------|----------------------|-----------------|---------------------|---------------------|----------------|
| 11B       | 2412    | 16.87                | 17.26                | /               | 48.64               | 53.21               | /              |
|           | 2437    | 17.07                | 17.43                | /               | <b>50.93</b>        | <b>55.34</b>        | /              |
|           | 2462    | 17.04                | 17.33                | /               | 50.58               | 54.08               | /              |
| 11G       | 2412    | 14.94                | 15.46                | /               | 31.19               | 35.16               | /              |
|           | 2437    | 14.82                | 14.83                | /               | 30.34               | 30.41               | /              |
|           | 2462    | 14.49                | 14.65                | /               | 28.12               | 29.17               | /              |
| 11N20MIMO | 2412    | 13.35                | 13.63                | 16.50           | 21.63               | 23.07               | 44.67          |
|           | 2437    | 13.43                | 13.67                | 16.56           | 22.03               | 23.28               | <b>45.29</b>   |
|           | 2462    | 13.18                | 13.75                | 16.48           | 20.80               | 23.71               | 44.46          |



The Power Data is based on the RF Test Report SHCR220100001502-5GHz

| Test Mode | Test Channel | Antenna 1 Power[dBm] | Antenna 2 Power[dBm] | MIMO Power[dBm] | Antenna 1 Power[mW] | Antenna 2 Power[mW] | MIMO Power[mW] |
|-----------|--------------|----------------------|----------------------|-----------------|---------------------|---------------------|----------------|
| 11A       | 5180         | 13.41                | 13.21                | /               | 21.93               | 20.94               | /              |
|           | 5200         | 13.31                | 13.63                | /               | 21.43               | 23.07               | /              |
|           | 5240         | 13.65                | 13.83                | /               | 23.17               | 24.15               | /              |
|           | 5260         | 13.26                | 13.59                | /               | 21.18               | 22.86               | /              |
|           | 5300         | 13.14                | 13.67                | /               | 20.61               | 23.28               | /              |
|           | 5320         | 12.66                | 13.69                | /               | 18.45               | 23.39               | /              |
|           | 5500         | 13.97                | 14.30                | /               | 24.95               | 26.92               | /              |
|           | 5580         | 13.47                | 14.04                | /               | 22.23               | 25.35               | /              |
|           | 5700         | 13.13                | 14.88                | /               | 20.56               | 30.76               | /              |
|           | 5745         | 14.82                | 15.02                | /               | <b>30.34</b>        | <b>31.77</b>        | /              |
|           | 5785         | 14.53                | 14.61                | /               | 28.38               | 28.91               | /              |
|           | 5825         | 13.96                | 14.68                | /               | 24.89               | 29.38               | /              |
| 11N20     | 5180         | 11.13                | 11.35                | 14.25           | 12.97               | 13.65               | 26.61          |
|           | 5200         | 10.88                | 11.17                | 14.04           | 12.25               | 13.09               | 25.35          |
|           | 5240         | 10.74                | 10.70                | 13.73           | 11.86               | 11.75               | 23.60          |
|           | 5260         | 11.04                | 11.03                | 14.05           | 12.71               | 12.68               | 25.41          |
|           | 5300         | 10.34                | 11.54                | 13.99           | 10.81               | 14.26               | 25.06          |
|           | 5320         | 10.08                | 11.04                | 13.60           | 10.19               | 12.71               | 22.91          |
|           | 5500         | 11.38                | 11.41                | 14.41           | 13.74               | 13.84               | 27.61          |
|           | 5580         | 10.69                | 10.79                | 13.75           | 11.72               | 11.99               | 23.71          |
|           | 5700         | 9.72                 | 10.66                | 13.23           | 9.38                | 11.64               | 21.04          |
|           | 5745         | 11.52                | 11.46                | 14.50           | 14.19               | 14.00               | 28.18          |
|           | 5785         | 11.15                | 11.14                | 14.16           | 13.03               | 13.00               | 26.06          |
|           | 5825         | 11.25                | 11.32                | 14.30           | 13.34               | 13.55               | 26.92          |
| 11N40     | 5190         | 11.12                | 11.00                | 14.07           | 12.94               | 12.59               | 25.53          |
|           | 5230         | 10.81                | 10.87                | 13.85           | 12.05               | 12.22               | 24.27          |
|           | 5270         | 11.08                | 11.12                | 14.11           | 12.82               | 12.94               | 25.76          |
|           | 5310         | 10.48                | 10.52                | 13.51           | 11.17               | 11.27               | 22.44          |
|           | 5510         | 11.57                | 11.45                | 14.52           | 14.35               | 13.96               | 28.31          |
|           | 5550         | 10.97                | 11.00                | 14.00           | 12.50               | 12.59               | 25.12          |
|           | 5670         | 10.30                | 10.33                | 13.33           | 10.72               | 10.79               | 21.53          |
|           | 5755         | 11.52                | 11.48                | 14.51           | 14.19               | 14.06               | 28.25          |
| 11AC20    | 5795         | 10.90                | 10.89                | 13.91           | 12.30               | 12.27               | 24.60          |
|           | 5180         | 11.12                | 11.03                | 14.09           | 12.94               | 12.68               | 25.64          |
|           | 5200         | 11.05                | 10.88                | 13.98           | 12.74               | 12.25               | 25.00          |
|           | 5240         | 10.56                | 10.74                | 13.66           | 11.38               | 11.86               | 23.23          |
|           | 5260         | 11.00                | 11.01                | 14.02           | 12.59               | 12.62               | 25.23          |
|           | 5300         | 10.72                | 10.70                | 13.72           | 11.80               | 11.75               | 23.55          |
|           | 5320         | 10.42                | 10.35                | 13.40           | 11.02               | 10.84               | 21.88          |
|           | 5500         | 11.46                | 11.53                | 14.51           | 14.00               | 14.22               | 28.25          |
|           | 5580         | 10.57                | 10.61                | 13.60           | 11.40               | 11.51               | 22.91          |
|           | 5700         | 10.55                | 10.60                | 13.59           | 11.35               | 11.48               | 22.86          |
|           | 5745         | 11.28                | 11.42                | 14.36           | 13.43               | 13.87               | 27.29          |
|           | 5785         | 10.86                | 11.30                | 14.10           | 12.19               | 13.49               | 25.70          |
| 11AC40    | 5825         | 11.48                | 11.52                | 14.51           | 14.06               | 14.19               | 28.25          |
|           | 5190         | 11.01                | 10.91                | 13.97           | 12.62               | 12.33               | 24.95          |
|           | 5230         | 10.49                | 10.50                | 13.51           | 11.19               | 11.22               | 22.44          |



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|        |      |       |       |       |       |       |              |
|--------|------|-------|-------|-------|-------|-------|--------------|
|        | 5270 | 10.78 | 10.83 | 13.82 | 11.97 | 12.11 | 24.10        |
|        | 5310 | 10.17 | 10.10 | 13.15 | 10.40 | 10.23 | 20.65        |
|        | 5510 | 11.35 | 11.39 | 14.38 | 13.65 | 13.77 | 27.42        |
|        | 5550 | 10.61 | 10.82 | 13.73 | 11.51 | 12.08 | 23.60        |
|        | 5670 | 10.43 | 11.28 | 13.89 | 11.04 | 13.43 | 24.49        |
|        | 5755 | 11.66 | 11.80 | 14.74 | 14.66 | 15.14 | <b>29.79</b> |
|        | 5795 | 10.69 | 11.04 | 13.88 | 11.72 | 12.71 | 24.43        |
| 11AC80 | 5210 | 11.00 | 11.03 | 14.03 | 12.59 | 12.68 | 25.29        |
|        | 5290 | 10.77 | 10.88 | 13.84 | 11.94 | 12.25 | 24.21        |
|        | 5530 | 11.18 | 11.20 | 14.20 | 13.12 | 13.18 | 26.30        |
|        | 5610 | 11.41 | 11.49 | 14.46 | 13.84 | 14.09 | 27.93        |
|        | 5775 | 11.35 | 11.58 | 14.48 | 13.65 | 14.39 | 28.05        |



## 5.2 MPE Calculation

According to the formula  $S=P/4\pi R^2$ , we can calculate S which is MPE.

Note:

- 1) P (mW)
- 2) R = distance to the center of radiation of antenna (in meter) = 20cm
- 3) MPE limit = 1mW/cm<sup>2</sup>

For FCC:

For 2.4G WiFi –Antenna1:

| The max. antenna gain is   |                        | 4.8                      | dBi                                 |                             |        |
|----------------------------|------------------------|--------------------------|-------------------------------------|-----------------------------|--------|
| Max. Conducted Power P(mW) | Gain in Linear Scale G | Operation Distance R(cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Result |
| 50.93                      | 3.020                  | 20                       | 0.03060                             | 1                           | Pass   |

For 2.4G WiFi –Antenna2:

| The max. antenna gain is   |                        | 4.34                     | dBi                                 |                             |        |
|----------------------------|------------------------|--------------------------|-------------------------------------|-----------------------------|--------|
| Max. Conducted Power P(mW) | Gain in Linear Scale G | Operation Distance R(cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Result |
| 55.34                      | 2.716                  | 20                       | 0.02991                             | 1                           | Pass   |

In MIMO mode:

Two antennas can transmit simultaneously and they are correlated.

| The max. antenna gain is   |                        | 7.58                     | dBi                                 |                             |        |
|----------------------------|------------------------|--------------------------|-------------------------------------|-----------------------------|--------|
| Max. Conducted Power P(mW) | Gain in Linear Scale G | Operation Distance R(cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Result |
| 45.29                      | 5.728                  | 20                       | 0.05161                             | 1                           | Pass   |



For 5G WiFi –Antenna1:

| The max. antenna gain is   |                        | 3.48                     | dBi                                 |                             |        |
|----------------------------|------------------------|--------------------------|-------------------------------------|-----------------------------|--------|
| Max. Conducted Power P(mW) | Gain in Linear Scale G | Operation Distance R(cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Result |
| 30.34                      | 2.228                  | 20                       | 0.01345                             | 1                           | Pass   |

For 2.4G WiFi –Antenna2:

| The max. antenna gain is   |                        | 2.39                     | dBi                                 |                             |        |
|----------------------------|------------------------|--------------------------|-------------------------------------|-----------------------------|--------|
| Max. Conducted Power P(mW) | Gain in Linear Scale G | Operation Distance R(cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Result |
| 31.77                      | 1.734                  | 20                       | 0.01096                             | 1                           | Pass   |

In MIMO mode:

Two antennas can transmit simultaneously and they are correlated.

| The max. antenna gain is   |                        | 5.96                     | dBi                                 |                             |        |
|----------------------------|------------------------|--------------------------|-------------------------------------|-----------------------------|--------|
| Max. Conducted Power P(mW) | Gain in Linear Scale G | Operation Distance R(cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Result |
| 29.79                      | 3.945                  | 20                       | 0.02338                             | 1                           | Pass   |

2.4G WiFi and 5G WiFi modules can simultaneous transmitting, so the maximum rate of MPE is  $0.05161/1.0+0.02338/1.0=0.075\leq 1.0$ . according to the KDB447498 section 7.2 determine the device is exclusion from SAR test

For IC:

For 2.4GHz WiFi SISO mode:

Antenna 1:E.I.R.P.=  $P \times G = 0.05093 \times 3.020 = 0.154W < 2.68W$

Antenna 2:E.I.R.P.=  $P \times G = 0.05534 \times 2.716 = 0.150W < 2.68W$

For 2.4GHz WiFi MIMO mode: E.I.R.P.=  $P \times G = 0.04529 \times 5.728 = 0.259W < 2.68W$

For 5GHz WiFi SISO mode:

Antenna 1:E.I.R.P.=  $P \times G = 0.03034 \times 2.228 = 0.068W < 4.53W$

Antenna 2:E.I.R.P.=  $P \times G = 0.03177 \times 1.734 = 0.055W < 4.53W$

For 5GHz WiFi MIMO mode: E.I.R.P.=  $P \times G = 0.02979 \times 3.945 = 0.118W < 4.53W$

2.4G WiFi and 5G WiFi modules can simultaneous transmitting, so the maximum rate of MPE is  $0.259/2.68+0.118/4.53=0.123\leq 1$

So the device is exclusion from SAR test

**--End of the Report--**

