

1 Cover Page

RF MPE REPORT

Application No.: SHCR2201000021AT
FCC ID: UCZ-W482CA-Z1
IC : 8575A-W482CAZ1
Applicant: LOREX Technology Inc.
Address of Applicant: 250 Royal Crest Court, Markham, ON L3R 3S1 Canada
Manufacturer: LOREX Technology Inc.
Address of Manufacturer: 250 Royal Crest Court, Markham, ON L3R 3S1 Canada

Equipment Under Test (EUT):

EUT Name: 2K Wi-Fi Smart Deterrence Camera
Model No.: W482CA-Z
HVIN: W482CA-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: 2021-12-07
Date of Test: 2022-01-05 to 2022-01-18
Date of Issue: 2022-01-19

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Parlam Zhan

Parlam Zhan
E&E Section Manager



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Revision Record			
Version	Description	Date	Remark
00	Original	2022-01-19	/

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/1.5A by adapter
DFS Function:	Slave without Radar detection
TPC Function:	Not Support
Serial Number:	ND012001025687
Firmware Version:	V2.8

3.2 Technical Specifications

For 2.4GHz

Antenna Gain:	Antenna 1:4.35dBi (Provided by manufacturer) Antenna 2:4.67dBi (Provided by manufacturer) Directional gain:7.52dBi
Antenna Type:	Antenna 1:PCB antenna, Antenna 2:PCB antenna
Channel Spacing:	5MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK) 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

For 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) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)			



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Channel Spacing:	802.11a/n(HT20)/ac(VHT20): 20MHz 802.11n(HT40)/ac(VHT40): 40MHz 802.11ac(VHT80): 80MHz
Data Rate:	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: MCS0-15 802.11ac: MCS0-9
Antenna Gain:	Antenna 1:4.91dBi; (Provided by manufacturer) Antenna 2:6.81dBi; (Provided by manufacturer) Directional Gain:8.92dBi
Antenna Type:	Antenna 1: PCB Antenna; Antenna 2: PCB Antenna

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



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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.



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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 ²)	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 SHCR220100002101

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	17.32	17.18	/	53.95	52.24	/
	2437	17.51	17.02	/	56.36	50.35	/
	2462	17.52	16.87	/	56.49	48.64	/
11G	2412	16.84	16.30	/	48.31	42.66	/
	2437	16.79	15.97	/	47.75	39.54	/
	2462	16.46	15.75	/	44.26	37.58	/
11N20MIMO	2412	15.47	15.06	18.28	35.24	32.06	67.30
	2437	15.51	14.95	18.25	35.56	31.26	66.83
	2462	15.26	14.85	18.07	33.57	30.55	64.12



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The Power Data is based on the RF Test Report SHCR220100002102

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	14.30	14.20	/	26.92	26.30	/
	5200	14.17	14.06	/	26.12	25.47	/
	5240	13.65	13.75	/	23.17	23.71	/
	5260	14.39	13.61	/	27.48	22.96	/
	5300	14.57	13.71	/	28.64	23.50	/
	5320	14.03	13.38	/	25.29	21.78	/
	5500	14.82	14.01	/	30.34	25.18	/
	5580	14.18	14.15	/	26.18	26.00	/
	5700	14.16	13.21	/	26.06	20.94	/
	5745	14.07	14.10	/	25.53	25.70	/
	5785	13.70	13.84	/	23.44	24.21	/
	5825	13.89	13.92	/	24.49	24.66	/
11N20	5180	11.98	11.60	14.80	15.78	14.45	30.20
	5200	11.72	11.45	14.60	14.86	13.96	28.84
	5240	11.58	11.50	14.55	14.39	14.13	28.51
	5260	11.63	11.80	14.73	14.55	15.14	29.72
	5300	11.95	11.90	14.94	15.67	15.49	31.19
	5320	11.46	11.81	14.65	14.00	15.17	29.17
	5500	11.31	11.35	14.34	13.52	13.65	27.16
	5580	10.47	11.50	14.03	11.14	14.13	25.29
	5700	11.57	11.60	14.60	14.35	14.45	28.84
	5745	11.08	11.06	14.08	12.82	12.76	25.59
	5785	11.79	11.58	14.70	15.10	14.39	29.51
	5825	11.70	11.78	14.75	14.79	15.07	29.85
11N40	5190	11.19	11.24	14.23	13.15	13.30	26.49
	5230	10.62	10.68	13.66	11.53	11.69	23.23
	5270	11.83	11.66	14.76	15.24	14.66	29.92
	5310	11.05	11.05	14.06	12.74	12.74	25.47
	5510	11.14	11.05	14.11	13.00	12.74	25.76
	5550	11.86	11.88	14.88	15.35	15.42	30.76
	5670	11.50	11.45	14.49	14.13	13.96	28.12
	5755	11.50	11.52	14.52	14.13	14.19	28.31
11AC20	5180	11.59	11.43	14.52	14.42	13.90	28.31
	5200	11.50	11.36	14.44	14.13	13.68	27.80
	5240	11.18	11.12	14.16	13.12	12.94	26.06
	5260	11.20	11.57	14.40	13.18	14.35	27.54
	5300	11.40	11.40	14.41	13.80	13.80	27.61
	5320	11.22	11.34	14.29	13.24	13.61	26.85
	5500	11.43	11.26	14.36	13.90	13.37	27.29
	5580	11.10	11.17	14.15	12.88	13.09	26.00
	5700	11.19	11.45	14.33	13.15	13.96	27.10
	5745	11.01	11.21	14.12	12.62	13.21	25.82
	5785	10.88	11.74	14.34	12.25	14.93	27.16
	5825	11.18	11.06	14.13	13.12	12.76	25.88
11AC40	5190	10.84	10.95	13.91	12.13	12.45	24.60
	5230	10.72	10.72	13.73	11.80	11.80	23.60



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	5270	11.41	11.39	14.41	13.84	13.77	27.61
	5310	11.13	10.81	13.98	12.97	12.05	25.00
	5510	11.68	11.44	14.57	14.72	13.93	28.64
	5550	12.12	11.15	14.67	16.29	13.03	29.31
	5670	10.75	11.75	14.29	11.89	14.96	26.85
	5755	11.41	11.38	14.41	13.84	13.74	27.61
	5795	11.09	11.05	14.08	12.85	12.74	25.59
11AC80	5210	11.54	11.29	14.43	14.26	13.46	27.73
	5290	11.83	12.13	14.99	15.24	16.33	31.55
	5530	11.66	11.48	14.58	14.66	14.06	28.71
	5610	11.11	11.05	14.09	12.91	12.74	25.64
	5775	11.51	11.58	14.56	14.16	14.39	28.58



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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/cm²

For FCC:

For 2.4G WiFi –Antenna1:

The max. antenna gain is		4.35	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
56.49	2.723	20	0.03060	1	Pass

For 2.4G WiFi –Antenna2:

The max. antenna gain is		4.67	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
52.24	2.931	20	0.03046	1	Pass

In MIMO mode:

Two antennas can transmit simultaneously and they are correlated.

The max. antenna gain is		7.52	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
67.3	5.649	20	0.07564	1	Pass



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For 5G WiFi –Antenna1:

The max. antenna gain is		4.91	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
30.34	3.097	20	0.01870	1	Pass

For 5G WiFi –Antenna2:

The max. antenna gain is		6.81	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
26.3	4.797	20	0.02510	1	Pass

In MIMO mode:

Two antennas can transmit simultaneously and they are correlated.

The max. antenna gain is		8.92	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
31.55	7.798	20	0.04895	1	Pass

2.4G WiFi and 5G WiFi can simultaneous transmitting, so the maximum rate of MPE is $0.07564/1.0+0.04895/1.0=0.12459 \leq 1.0$. 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: $E.I.R.P. = P \times G = 0.05649 \times 2.723 = 0.15W < 2.68W$

Antenna 2: $E.I.R.P. = P \times G = 0.05224 \times 2.931 = 0.15W < 2.68W$

For 2.4GHz WiFi MIMO mode: $E.I.R.P. = P \times G = 0.06730 \times 5.649 = 0.38W < 2.68W$

For 5GHz WiFi SISO mode:

Antenna 1: $E.I.R.P. = P \times G = 0.03034 \times 3.097 = 0.094W < 4.53W$

Antenna 2: $E.I.R.P. = P \times G = 0.026 \times 4.797 = 0.125W < 4.53W$

For 5GHz WiFi MIMO mode: $E.I.R.P. = P \times G = 0.3155 \times 7.798 = 2.46W < 4.53W$

2.4G WiFi and 5G WiFi can simultaneous transmitting, so the maximum rate of MPE is $0.38/2.68+2.46/4.53=0.68 \leq 1$

So the device is exclusion from SAR test

--End of the Report--



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