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RF MPE REPORT

Application No.:	SHCR2110000793AT
FCC ID:	UCZ-W482CA-Z2
IC :	8575A-W482CAZ2
Applicant:	Lorex Technology Inc.
Address of Applicant:	250 Royal crest Court, Markham, L3R 3S1, Ontario, Canada.
Manufacturer:	Lorex Technology Inc.
Address of Manufacturer:	250 Royal crest Court, Markham, L3R 3S1, Ontario, Canada.
Equipment Under Test (EUT):	
EUT Name:	2K QHD Wi-Fi Deterrence Camera
Model No.:	W482CA-Z
Standard(s) :	FCC Rules 47 CFR §2.1091 KDB447498 D01 General RF Exposure Guidance v06 RSS-102 Issue 5 Amendment 1 (February 2, 2021)
Date of Receipt:	2021-11-16
Date of Test:	2021-11-17 to 2021-12-09
Date of Issue:	2021-12-10
Test Result:	**Pass***

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

Parlam Zhan

Parlam Zhan
E&E Section Manager

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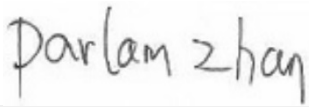
Revision Record			
Version	**Description**	**Date**	**Remark**
00	Original	2021-12-10	/

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 by Adapter Adapter: MODEL: S018BYU1200150 INPUT: 100-240V~50/60Hz 600mA OUTPUT: DC 5V/9V/12V, 3A/2A/1.5A
HVIN:	W482CA-Z2
Serial Number:	ND012109014925
Firmware Version:	V2.8

3.2 Technical Specifications

2.4GHz

Antenna Gain:	Ant 1: 4.35dBi(Provided by manufacturer) Ant 2: 4.67dBi(Provided by manufacturer) Directional Gain: 7.52dBi
Antenna Type:	Antenna 1: FPC Antenna Antenna 2: FPC Antenna
Channel Spacing:	5MHz
Data Rate:	802.11b: 1/2/5.5/11Mbps, 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: MCS 0 to 7 for HT20MHz
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

5G

Operation Frequency:	Band	Mode	Frequency Range(MHz)	Number of channels
	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)			
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: FPC Antenna; Antenna 2: FPC 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

5 Measurement and Calculation

5.1 Maximum transmit power

The Power Data is based on the RF Test Report SHCR211000079301-2.4GHz

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	18.17	18.33	NA	**65.61**	68.08	N/A
11B	2437	17.91	18.34	NA	61.80	68.23	N/A
11B	2462	17.87	18.35	NA	61.24	**68.39**	N/A
11G	2412	15.87	15.57	NA	38.64	36.06	N/A
11G	2437	17.71	17.89	NA	59.02	61.52	N/A
11G	2462	17.62	17.85	NA	57.81	60.95	N/A
11N20MIMO	2412	15.70	15.34	18.53	37.15	34.20	71.29
11N20MIMO	2437	10.79	15.97	17.12	11.99	39.54	51.52
11N20MIMO	2462	17.41	16.79	20.12	55.08	47.75	**102.80**

2.4GHz EIRP for ISED

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	22.52	23.00	NA	**178.65**	199.53	N/A
11B	2437	22.26	23.01	NA	168.27	199.99	N/A
11B	2462	22.22	23.02	NA	166.72	**200.45**	N/A
11G	2412	20.22	20.24	NA	105.20	105.68	N/A
11G	2437	22.06	22.56	NA	160.69	180.30	N/A
11G	2462	21.97	22.52	NA	157.40	178.65	N/A
11N20MIMO	2412	20.05	20.01	26.05	101.16	100.23	402.72
11N20MIMO	2437	15.14	20.64	24.64	32.66	115.88	291.07
11N20MIMO	2462	21.76	21.46	27.64	149.97	139.96	**580.76**

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5GHz for FCC:

The Power Data is based on the RF Test Report SHCR211000079302-5GHz

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	14.62	14.88	NA	28.97	30.76	NA
11A	5200	14.41	14.66	NA	27.61	29.24	NA
11A	5240	14.64	14.60	NA	29.11	28.84	NA
11A	5260	14.79	14.90	NA	30.13	30.90	NA
11A	5300	15.09	14.77	NA	32.28	29.99	NA
11A	5320	14.76	14.82	NA	29.92	30.34	NA
11A	5500	14.90	15.32	NA	30.90	34.04	NA
11A	5580	13.36	14.22	NA	21.68	26.42	NA
11A	5700	13.75	13.41	NA	23.71	21.93	NA
11A	5745	13.56	13.98	NA	22.70	25.00	NA
11A	5785	13.94	13.77	NA	24.77	23.82	NA
11A	5825	13.87	13.86	NA	24.38	24.32	NA
11N20	5180	12.54	13.03	15.80	17.95	20.09	38.02
11N20	5200	12.93	13.22	16.09	19.63	20.99	40.64
11N20	5240	13.11	13.10	16.12	20.46	20.42	40.93
11N20	5260	14.57	15.07	17.84	28.64	32.14	60.81
11N20	5300	14.89	14.67	17.79	30.83	29.31	60.12
11N20	5320	14.77	15.01	17.90	29.99	31.70	61.66
11N20	5500	14.61	15.21	17.93	28.91	33.19	62.09
11N20	5580	13.93	14.32	17.14	24.72	27.04	51.76
11N20	5700	13.99	14.04	17.03	25.06	25.35	50.47
11N20	5745	13.57	14.01	16.81	22.75	25.18	47.97
11N20	5785	13.78	13.56	16.68	23.88	22.70	46.56
11N20	5825	13.92	13.86	16.90	24.66	24.32	48.98
11N40	5190	15.26	15.37	18.33	33.57	34.43	**68.08**
11N40	5230	15.36	15.15	18.27	**34.36**	32.73	67.14
11N40	5270	14.02	14.48	17.27	25.23	28.05	53.33
11N40	5310	15.20	14.90	18.06	33.11	30.90	63.97
11N40	5510	14.56	15.78	18.22	28.58	**37.84**	66.37
11N40	5550	14.22	14.95	17.61	26.42	31.26	57.68
11N40	5670	12.92	13.22	16.08	19.59	20.99	40.55

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11N40	5755	12.97	14.11	16.59	19.82	25.76	45.60
11N40	5795	13.07	13.74	16.43	20.28	23.66	43.95
11AC20	5180	13.69	13.23	16.48	23.39	21.04	44.46
11AC20	5200	13.37	12.77	16.09	21.73	18.92	40.64
11AC20	5240	13.17	13.22	16.21	20.75	20.99	41.78
11AC20	5260	12.71	13.52	16.14	18.66	22.49	41.11
11AC20	5300	12.91	13.10	16.02	19.54	20.42	39.99
11AC20	5320	12.93	13.20	16.08	19.63	20.89	40.55
11AC20	5500	12.78	13.63	16.24	18.97	23.07	42.07
11AC20	5580	12.94	12.88	15.92	19.68	19.41	39.08
11AC20	5700	12.92	12.33	15.65	19.59	17.10	36.73
11AC20	5745	12.84	12.35	15.61	19.23	17.18	36.39
11AC20	5785	13.26	13.07	16.18	21.18	20.28	41.50
11AC20	5825	12.34	12.22	15.29	17.14	16.67	33.81
11AC40	5190	13.75	13.49	16.63	23.71	22.34	46.03
11AC40	5230	13.26	12.65	15.98	21.18	18.41	39.63
11AC40	5270	13.01	12.79	15.91	20.00	19.01	38.99
11AC40	5310	13.02	13.04	16.04	20.04	20.14	40.18
11AC40	5510	12.43	13.62	16.08	17.50	23.01	40.55
11AC40	5550	11.85	12.29	15.09	15.31	16.94	32.28
11AC40	5670	11.91	11.82	14.88	15.52	15.21	30.76
11AC40	5755	11.41	12.41	14.95	13.84	17.42	31.26
11AC40	5795	11.84	12.19	15.03	15.28	16.56	31.84
11AC80	5210	12.51	12.48	15.51	17.82	17.70	35.56
11AC80	5290	12.14	12.53	15.35	16.37	17.91	34.28
11AC80	5530	12.90	13.44	16.19	19.50	22.08	41.59
11AC80	5610	11.09	12.17	14.67	12.85	16.48	29.31
11AC80	5775	11.70	12.36	15.05	14.79	17.22	31.99

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5GHz EIRP for ISED

Mode	TX Type	Frequency (MHz)	E.I.R.P (dBm)			Verdict		
			Ant1	Ant2	MIMO	Ant1	Ant2	MIMO
802.11a	SISO	5260	19.70	21.71	/	93.33	148.25	/
		5300	20.00	21.58	/	100.00	143.88	/
		5320	19.67	21.63	/	92.68	145.55	/
		5500	19.81	22.13	/	95.72	163.31	/
		5580	18.27	21.03	/	67.14	126.77	/
		5700	18.66	20.22	/	73.45	105.20	/
		5745	18.47	20.79	/	/	/	/
		5785	18.85	20.58	/	/	/	/
		5825	18.78	20.67	/	/	/	/
802.11n (HT20)	MIMO	5260	19.48	21.88	26.76	88.72	154.17	474.24
		5300	19.80	21.48	26.71	95.50	140.60	468.81
		5320	19.68	21.82	26.82	92.90	152.05	480.84
		5500	19.52	22.02	26.85	89.54	159.22	484.17
		5580	18.84	21.13	26.06	76.56	129.72	403.65
		5700	18.90	20.85	25.95	77.62	121.62	393.55
		5745	18.48	20.82	25.73	/	/	/
		5785	18.69	20.37	25.60	/	/	/
		5825	18.83	20.67	25.82	/	/	/
802.11n (HT40)	MIMO	5270	18.93	21.29	26.19	78.16	134.59	415.91
		5310	20.11	21.71	26.98	**102.57**	148.25	498.88
		5510	19.47	22.59	27.14	88.51	**181.55**	**517.61**
		5550	19.13	21.76	26.53	81.85	149.97	449.78
		5670	17.83	20.03	25.00	60.67	100.69	316.23
		5755	17.88	20.92	25.51	/	/	/
		5795	17.98	20.55	25.35	/	/	/
802.11ac (VHT20)	MIMO	5260	17.62	20.33	25.06	57.81	107.89	320.63
		5300	17.82	19.91	24.94	60.53	97.95	311.89
		5320	17.84	20.01	25.00	60.81	100.23	316.23
		5500	17.69	20.44	25.16	58.75	110.66	328.10
		5580	17.85	19.69	24.84	60.95	93.11	304.79
		5700	17.83	19.14	24.57	60.67	82.04	286.42

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		5745	17.75	19.16	24.53	/	/	/
		5785	18.17	19.88	25.10	/	/	/
		5825	17.25	19.03	24.21	/	/	/
802.11ac (VHT40)	MIMO	5270	17.92	19.60	24.83	61.94	91.20	304.09
		5310	17.93	19.85	24.96	62.09	96.61	313.33
		5510	17.34	20.43	25.00	54.20	110.41	316.23
		5550	16.76	19.10	24.01	47.42	81.28	251.77
		5670	16.82	18.63	23.80	48.08	72.95	239.88
		5755	16.32	19.22	23.87	/	/	/
		5795	16.75	19.00	23.95	/	/	/
802.11ac (VHT80)	MIMO	5290	17.05	19.34	24.27	50.70	85.90	267.30
		5530	17.81	20.25	25.11	60.39	105.93	324.34
		5690	16.00	18.98	23.59	39.81	79.07	228.56
		5775	16.61	19.17	23.97	/	/	/

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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
65.61	2.723	20	0.03554	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
68.39	2.931	20	0.03988	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
102.8	5.649	20	0.11554	1	Pass

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
34.36	3.097	20	0.02117	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
37.84	4.797	20	0.03611	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
68.08	7.798	20	0.10562	1	Pass

The 2.4GHz WiFi and 5GHz WiFi can transmit simultaneously, but the maximum rate of MPE is 0.11554/1+0.10562/1=0.22116≤1. 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*G= 0.06561×2.723=0.179W<2.68W

Antenna 2:E.I.R.P.= P*G= 0.06839×2.931=0.200W<2.68W

For 2.4GHz WiFi MIMO mode: E.I.R.P.= P*G= 0.1028×5.649=0.581W<2.68W

For 5GHz WiFi SISO mode:

Antenna 1:E.I.R.P.= P*G= 0.03311×3.097=0.103W<4.53W

Antenna 2:E.I.R.P.= P*G= 0.03784×4.797=0.182W<4.53W

For 5GHz WiFi MIMO mode: E.I.R.P.= P*G= 0.06637×7.798=0.518W<4.53W

The 2.4GHz WiFi and 5GHz WiFi can transmit simultaneously, but the maximum rate of MPE is 0.581/2.68+0.518/4.53=0.3311≤1. So the device is exclusion from SAR test

--End of the Report--

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