



# RF Exposure Evaluation

For

Chengdu Hotack Technology Co., Ltd.

Projector

Test Model: X3

Additional Model No.: Please Refer to Page 6

Prepared for : Chengdu Hotack Technology Co., Ltd.  
Address : 501-502, Unit 3, Building 13, No. 666 Jinfenghuang Avenue,  
High-tech Industry Park, Jinniu District, Chengdu City, Si Chuan  
Province, China.

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.  
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Date of receipt of test sample : April 03, 2025  
Number of tested samples : 2  
Sample No. : A250401090-1, A250401090-2  
Serial number : Prototype  
Date of Test : April 03, 2025 ~ April 17, 2025  
Date of Report : April 18, 2025





<b>RF Exposure Evaluation</b>	
<b>Report Reference No.</b> .....	<b>LCSEA04025048EF</b>
Date of Issue .....	April 18, 2025
<b>Testing Laboratory Name</b> .....	<b>Shenzhen LCS Compliance Testing Laboratory Ltd.</b>
Address .....	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Testing Location/ Procedure .....	Full application of Harmonised standards <input checked="" type="checkbox"/> Partial application of Harmonised standards <input type="checkbox"/> Other standard testing method <input type="checkbox"/>
<b>Applicant's Name</b> .....	<b>Chengdu Hotack Technology Co., Ltd.</b>
Address .....	501-502, Unit 3, Building 13, No. 666 Jinfenghuang Avenue, High-tech Industry Park, Jinniu District, Chengdu City, Si Chuan Province, China.
<b>Test Specification</b>	
Standard .....	FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06 FCC CFR 47 part1 1.1310 FCC CFR 47 part2 2.1091
<b>Test Report Form No.</b> .....	TRF-4-E-214 A/0
TRF Originator .....	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF .....	Dated 2011-03
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<b>EUT Description.</b> .....	<b>Projector</b>
Trade Mark .....	N/A
Test Model .....	X3
Ratings .....	Input: 45V $\overline{\text{---}}$ 0.85A, 12V $\overline{\text{---}}$ 0.7A (Simultaneous Input)
Result .....	<b>PASS</b>

Compiled by:

*Nadia Zhou*

Nadia Zhou/ Administrator

Supervised by:

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Jack Liu/ Technique principal

Approved by:

*Gavin Liang*

Gavin Liang/ Manager





### RF Exposure Evaluation

<b>Test Report No. :</b> LCSEA04025048EF	<u>April 18, 2025</u> Date of issue
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Test Model.....	: X3
EUT.....	: Projector
<b>Applicant.....</b>	<b>: Chengdu Hotack Technology Co., Ltd.</b>
Address.....	: 501-502, Unit 3, Building 13, No. 666 Jinfenghuang Avenue, High-tech Industry Park, Jinniu District, Chengdu City, Si Chuan Province, China.
Telephone.....	: /
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<b>Manufacturer.....</b>	<b>: Chengdu Hotack Technology Co., Ltd.</b>
Address.....	: 501-502, Unit 3, Building 13, No. 666 Jinfenghuang Avenue, High-tech Industry Park, Jinniu District, Chengdu City, Si Chuan Province, China.
Telephone.....	: /
Fax.....	: /
<b>Factory.....</b>	<b>: Chengdu Hotack Technology Co., Ltd.</b>
Address.....	: 501-502, Unit 3, Building 13, No. 666 Jinfenghuang Avenue, High-tech Industry Park, Jinniu District, Chengdu City, Si Chuan Province, China.
Telephone.....	: /
Fax.....	: /

<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.





### Revision History

Report Version	Issue Date	Revision Content	Revised By
000	April 18, 2025	Initial Issue	---



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**1. Product Information**

EUT	:	Projector
Test Model	:	X3
Additional Model No.	:	X3AQ, X3BQ, X3CQ, X3 One, X3 Pro, X3 Max, X3 Plus, C3, D3, X3P, L600, L600D, L600G, L600X, X3 Ultra, HY310X, HY310X NTV, Gimbal A5, Gimbal N5, Smoon 420, AC1066, X3A, X3B, X3C, X3D, X3E, X3F, X3G, X3H, X3J, X3K, X3L, X3M, X3N, X3Q, X3R, X3S, X3T, X3U, X3W, X3Z
Model Declaration	:	Only the appearance color or shape is different, but the structure and circuit scheme (principle, PCB) are the same, So no additional models were tested
Power Supply	:	Input: 45V $\approx$ 0.85A, 12V $\approx$ 0.7A (Simultaneous Input)
Hardware Version	:	/
Software Version	:	/
<b>Bluetooth</b>		
Frequency Range	:	2402MHz~2480MHz
Channel Number	:	79 channels for Bluetooth (DSS) 40 channels for Bluetooth (DTS)
Channel Spacing	:	1MHz for Bluetooth (DSS) 2MHz for Bluetooth (DTS)
Modulation Type	:	GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth (DSS) GFSK for Bluetooth (DTS)
Antenna Description	:	Internal Antenna, 3.68dBi(Max.)
<b>WIFI(2.4G Band)</b>		
Frequency Range	:	2412MHz~2462MHz
Channel Number	:	5MHz
Channel Spacing	:	11 Channels for 20MHz bandwidth (2412~2462MHz) 7 Channels for 40MHz bandwidth (2422~2452MHz)
Modulation Type	:	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Description	:	Internal Antenna, 5.3dBi(Max.)
<b>WIFI(5.2G Band)</b>		
Frequency Range	:	5180MHz~5240MHz
Channel Number	:	4 Channels for 20MHz bandwidth(5180MHz~5240MHz) 2 channels for 40MHz bandwidth(5190MHz~5230MHz)
Modulation Type	:	IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)





Antenna Description	:	Internal Antenna, 2.14dBi(Max.)
WIFI(5.8G Band)		
Frequency Range	:	5745MHz~5825MHz
Channel Number	:	5 channels for 20MHz bandwidth(5745MHz~5825MHz) 2 channels for 40MHz bandwidth(5755MHz~5795MHz)
Modulation Type	:	IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Antenna Description	:	Internal Antenna, 3.48dBi(Max.)
Exposure category	:	General population/uncontrolled environment
EUT Type	:	Production Unit
Device Type	:	Mobile Device

Note: For a more detailed antenna description, please refer to the antenna specifications or the antenna report provided by the customer.





### 2. Evaluation Method

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’s guidelines. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0. The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

### 3. Limit

#### 3.1 Refer Evaluation Method

[ANSI C95.1–2019](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: mobile devices.

#### 3.2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
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

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for Occupational/Uncontrolled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 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

\*=Plane-wave equivalent power density







### 4. MPE Calculation Method

Predication of MPE limit at a given distance  
Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S=PG/4\pi R^2$$

Where: S=power density  
P=power input to antenna  
G=power gain of the antenna in the direction of interest relative to an isotropic radiator  
R=distance to the center of radiation of the antenna

### 5. Antenna Information

EUT can only use antennas certificated as follows provided by manufacturer;

Internal/ External Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Notes
Internal	Internal Antenna	2400MHz ~ 6000MHz	Bluetooth: 3.68dBi 2.4GWIFI: 5.3dBi 5.2GWIFI: 2.14dBi 5.8GWIFI: 3.48dBi	BT/WIFI Antenna

### 6. Conducted Power

[BT]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
GFSK	0	2402	-0.62
	39	2441	-0.42
	78	2480	-1.49
π/4DQPSK	0	2402	1.20
	39	2441	1.34
	78	2480	0.21
8DPSK	0	2402	1.61
	19	2441	1.77
	39	2480	0.63

[BLE]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
BLE 1M	0	2402	1.21
	19	2440	1.03
	39	2480	0.11
BLE 2M	0	2402	1.08
	19	2440	0.86
	39	2480	-0.04





## [2.4G WIFI]

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)
11B	1	2412	15.25
	6	2437	14.63
	11	2462	14.61
11G	1	2412	14.57
	6	2437	15.02
	11	2462	13.84
11N20 SISO	1	2412	13.07
	6	2437	13.24
	11	2462	13.42
11N40 SISO	3	2422	13.64
	6	2437	12.58
	9	2452	13.46

## [5.2G WIFI]

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)
11A	36	5180	12.61
	40	5200	12.12
	48	5240	11.98
11N20 SISO	36	5180	11.28
	40	5200	11.89
	48	5240	11.20
11N40 SISO	38	5190	10.93
	46	5230	10.38
11AC20 SISO	36	5180	12.06
	40	5200	11.89
	48	5240	11.16
11AC40 SISO	38	5190	10.91
	46	5230	10.39

## [5.8G WIFI]

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)
11A	149	5745	12.16
	157	5785	11.84
	165	5825	11.72
11N20 SISO	149	5745	11.74
	157	5785	11.51
	165	5825	11.45
11N40 SISO	151	5755	11.63
	159	5795	11.04
11AC20 SISO	149	5745	12.03
	157	5785	11.49
	165	5825	11.39
11AC40 SISO	151	5755	11.67
	159	5795	11.05



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## 7. Manufacturing Tolerance

[BT]

GFSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	0	0	-1.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
$\pi/4$ DQPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	1.0	1.0	0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
8DPSK (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	1.0	1.0	0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

[BLE]

BLE 1M (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	1.0	1.0	0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
BLE 2M (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	1.0	0	0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

[2.4G WIFI]

11B (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	15.0	14.0	14.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11G (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	14.0	15.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11N20(Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	13.0	13.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11N40(Peak)			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	13.0	12.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0





[5.2G WIFI]

11A (AVG)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	12.0	12.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
11N20(AVG)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	11.0	11.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
11N40(AVG)			
Channel	Channel 38	Channel 46	
Target (dBm)	10.0	10.0	
Tolerance ±(dB)	1.0	1.0	
11AC20(AVG)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	12.0	11.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
11AC40(AVG)			
Channel	Channel 38	Channel 46	
Target (dBm)	10.0	10.0	
Tolerance ±(dB)	1.0	1.0	

[5.8G WIFI]

11A (AVG)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	12.0	11.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
11N20(AVG)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	11.0	11.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
11N40(AVG)			
Channel	Channel 151	Channel 159	
Target (dBm)	11.0	11.0	
Tolerance ±(dB)	1.0	1.0	
11AC20(AVG)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	12.0	11.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
11AC40(AVG)			
Channel	Channel 151	Channel 159	
Target (dBm)	11.0	11.0	
Tolerance ±(dB)	1.0	1.0	





## 8. Measurement Results

### 8.1 Standalone MPE Evaluation

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance,  $r = 20\text{cm}$ , as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

#### [BT]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm <sup>2</sup> )	MPE Limits (mW/cm <sup>2</sup> )
	dBm	mW				
GFSK	1.0	1.2589	3.68	2.3335	0.0006	1.0000
$\pi/4$ -DQPSK	2.0	1.5849	3.68	2.3335	0.0007	1.0000
8-DPSK	2.0	1.5849	3.68	2.3335	0.0007	1.0000

#### [BLE 1M]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm <sup>2</sup> )	MPE Limits (mW/cm <sup>2</sup> )
	dBm	mW				
GFSK	2.0	1.5849	3.68	2.3335	0.0007	1.0000

#### [BLE 2M]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm <sup>2</sup> )	MPE Limits (mW/cm <sup>2</sup> )
	dBm	mW				
GFSK	2.0	1.5849	3.68	2.3335	0.0007	1.0000

#### [2.4G WIFI]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm <sup>2</sup> )	MPE Limits (mW/cm <sup>2</sup> )
	dBm	mW				
IEEE 802.11b	16.0	39.8107	5.3	3.3884	0.0269	1.0000
IEEE 802.11g	16.0	39.8107	5.3	3.3884	0.0269	1.0000
IEEE 802.11n HT20	14.0	25.1189	5.3	3.3884	0.0169	1.0000
IEEE 802.11n HT40	14.0	25.1189	5.3	3.3884	0.0169	1.0000

#### [5.2G WIFI]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm <sup>2</sup> )	MPE Limits (mW/cm <sup>2</sup> )
	dBm	mW				
IEEE 802.11a	13.0	19.9526	2.14	1.6368	0.0065	1.0000
IEEE 802.11n HT20	12.0	15.8489	2.14	1.6368	0.0052	1.0000
IEEE 802.11n HT40	11.0	12.5893	2.14	1.6368	0.0041	1.0000
IEEE 802.11ac VHT20	13.0	19.9526	2.14	1.6368	0.0065	1.0000
IEEE 802.11ac VHT40	11.0	12.5893	2.14	1.6368	0.0041	1.0000





## [5.8G WIFI]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm <sup>2</sup> )	MPE Limits (mW/cm <sup>2</sup> )
	dBm	mW				
IEEE 802.11a	13.0	19.9526	3.48	2.2284	0.0089	1.0000
IEEE 802.11n HT20	12.0	15.8489	3.48	2.2284	0.0070	1.0000
IEEE 802.11n HT40	12.0	15.8489	3.48	2.2284	0.0070	1.0000
IEEE 802.11ac VHT20	13.0	19.9526	3.48	2.2284	0.0089	1.0000
IEEE 802.11ac VHT40	12.0	15.8489	3.48	2.2284	0.0070	1.0000

**Remark:**

1. Output power including tune-up tolerance;
2. Output power was adjusted to duty cycle at 100% if measured duty cycle less than 98%;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer.

**8.2 Simultaneous Transmission MPE Evaluation**

The EUT equipped with one Bluetooth antenna, one WIFI antenna. so need consider simultaneous transmission;

According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

Simultaneous Transmission				
Bluetooth Antenna Max MPE ratios	WIFI Antenna Max MPE ratios	∑ MPE ratios	Limit	Results
0.0007	0.0269	0.0276	1.0	Pass

**Remark:**

1. Output power including tune-up tolerance;
2. BT/BLE/2.4G WIFI output power is burst peak power;
3. 5G WIFI output power is burst average power;
4. MPE evaluate distance is 20cm from user manual provide by manufacturer;
5.  $MPE\ values = PG/4\pi R^2$
6. Bluetooth Antenna is Antenna1.

**9. Conclusion**

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

**10. Description of Test Facility**

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

Test Firm Registration Number: 254912.





### 11. Measurement Uncertainty

BT/BLE/2.4GWIFI/5.2GWIFI/5.8GWIFI:

Test Item	Frequency Range	Uncertainty	Note
Output power	1GHz-40GHz	±0.57dB	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

-----THE END OF REPORT-----

