

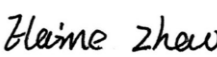




Test Report issued under the responsibility of:



TEST REPORT IEC 62471-7 Photobiological safety of lamps and lamp systems - Part 7: Light sources and luminaires primarily emitting visible radiation	
Report Number.	4791663937_1
Date of issue	2025-07-03
Total number of pages	14 including attachments
Name of Testing Laboratory preparing the Report	UL-CCIC Company Limited
Applicant's name	Lumileds (Shanghai) Management Co., Ltd.
Address	Building 1-A, No. 19 & 20, Lane 299, Wenshui Road, Jingan District, Shanghai, 200072, China
Test specification:	
Standard	IEC 62471-7:2023
Test procedure.....	CB Scheme
Non-standard test method.....	N/A
TRF template used	IECEE OD-2020-F1:2023, Ed.1.6
Test Report Form No.....	IEC62471_7B
Test Report Form(s) Originator	DEKRA Certification B.V.
Master TRF	Dated 2024-10-18
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General disclaimer:	
The test results presented in this report relate only to the object tested.	
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Test item description..... :	Built-in LED Package	
Trademark(s) :		
Manufacturer :	Same as Applicant	
Model/Type reference :	L1HX-AABB2CZZZZZZZ(see GPI for type designation)	
Ratings :	Imax 2500 mA === (see GPI for further ratings)	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	UL-CCIC Company Limited
Testing location/ address..... :		No.2, Chengwan Road, Suzhou Industrial Park Suzhou 215122, China
Tested by (name, function, signature)..... :		Chris Yi Project Handler 
Approved by (name, function, signature).... :		Elaine Zhao Project Reviewer 
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
Testing location/ address..... :		
Tested by (name, function, signature)..... :		
Approved by (name, function, signature).... :		
<input type="checkbox"/>	Testing procedure: CTF Stage 2:	
Testing location/ address..... :		
Tested by (name + signature) :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature).... :		
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	Testing procedure: CTF Stage 4:	
Testing location/ address..... :		
Tested by (name, function, signature)..... :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature).... :		
Supervised by (name, function, signature) :		

List of Attachments (including a total number of pages in each attachment): Components List (Enclosure 1): 1 page Photographs (Enclosure 2): 1 page	
Summary of testing:	
Tests performed (name of test and test clause): Clause 5.2 Actinic UV assessment for light sources 2024-10-08 Clause 6.2 UV-A light source and luminaire assessment 2024-10-08 Clause 7.2 Blue light hazard assessment for light sources 2024-10-08 Clause 8.2 Retinal thermal hazard for light source assessment 2024-10-08 Clause 9.2 Light source and luminaire assessment 2024-10-08 Clause 10.2 Light source and luminaire assessment 2024-10-08 The accuracy method decision rule is applied when the compliance or verdict is made to the results of this report.	Testing location: UL-CCIC Company Limited No.2, Chengwan Road, Suzhou Industrial Park Suzhou 215122, China
Summary of compliance with National Differences <ul style="list-style-type: none"> IECEE Member countries that are also CENELEC members Compliance with Group Differences evaluated <input type="checkbox"/> yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A IECEE Member countries with published National Differences which were evaluated: N/A IECEE Member countries that did not publish any National Differences: N/A <p>To support compliance with published National Differences, attach a compilation of relevant ND and/or GD TRFs to the CB Test Report.</p>	

Use of uncertainty of measurement for decisions on conformity (decision rule) :

☐ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

☒ Other: ... (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

Information on uncertainty of measurement:

The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.

IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



Note: Due to the limited amount of Built-in LED Package surface, the required markings and ratings may be provided on the smallest package

Test item particulars.....:	
Classification of installation and use.....: N/A	
Supply Connection DC Power	
Possible test case verdicts: - test case does not apply to the test object.....: N/A - test object does meet the requirement.....: P (Pass) - test object does not meet the requirement.....: F (Fail)	
Testing.....:	
Date of receipt of test item 2024-09-25	
Date (s) of performance of tests 2024-10-08	
General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator. <input type="checkbox"/> This Test Report Form contains requirements according to IEC/ISO Standard dated and includes Corrigendum dated (Note: The above text maybe removed if not applicable)	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60068-2-1:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies).....: Lumileds (Shanghai) Management Co., Ltd. Building 1-A, No. 19 & 20, Lane 299, Wenshui Road, Jingan District, Shanghai, 200072, China	
General product information and other remarks:	
The product under test is a Built-in LED package for lighting applications (indoor and outdoor use). L1HX-65702V0000000, with ANSI bin 6500K, See the appendix below for an explanation of the type designation.	

Type designation:

L1HX-AABB2CZZZZZZZZ

Where

AA: designates nominal CCT (e.g. 22=2200K, 27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K, 57=5700K, 65=6500K or any nominal CCT less than 6500K)

BB: designates minimum CRI (e.g. 70=70CRI, 80=80CRI, 90=90CRI or any CRI greater than min 70)

C: can be alphanumeric character that designates performance options (for example, E= Enhanced Flux Performance, V or else)

ZZZZZZZ – can be any alphanumeric character that can be used to designate customer-specific options.

Model No.	Drive current (mA)	1800K	2200K	2700K	3000K	3500K	4000K	5000K	5700K	6500K
L1HX-AABB2CZZZZZZZZ	2500	BLH-C	BLH-C	BLH-C	BLH-C	BLH-C	BLH-C	BLH-C	BLH-C	BLH-C
	2400	BLH-B	BLH-B	BLH-B	BLH-B	BLH-B	BLH-B	BLH-C	BLH-C	BLH-C
	130	BLH-A	BLH-A	BLH-A	BLH-A	BLH-A	BLH-A	BLH-A	BLH-A	BLH-A

Note: this table is declared by the manufacturer.

Models used for the tests:

Commercial Part Number	Drive current (mA)	Test Item				
		Actinic UV	UV-A hazard	Infrared hazard	Retinal blue light	Thermal hazard
L1HX-65702V0000000	2500	Range a	P	P	BLH-C	Above limit
	130	Range a	P	P	BLH-A	P
L1HX-40702V0000000	2500	Range a	P	P	BLH-C	Above limit
	2400	Range a	P	P	BLH-B	Above limit

Note: "P" means Pass,

"Above limit" means that the result has exceeded the limit value and the final product (luminaire) is needed to address the retinal heat hazard.

NOTE:

1. The measure was carried out at the distance of 200 mm, 1.7mard in the direction of maximum light output according to IEC 62471.
2. When the optical characteristic of the LED or any optical components are changed, re-measurement or further consideration should be necessary.
3. Simple Acceptance decision rule is applied when risk level is classified for the measurement result of the sample received.
4. Install the sample into the holder, with the back close to the heat sink for testing.
5. Only photobiological hazards were addressed.

IEC 62471-7			
Clause	Requirement + Test	Result - Remark	Verdict
4	OPTICAL RADIATION HAZARDS OF LIGHT SOURCES AND LUMINAIRES		P
	Measurements are carried out in accordance with IEC 62471:2006 unless otherwise specified in this document		P
	For light sources with pulse width modulation (PWM), emission levels of continuous light (continuous wave (CW)) are applied.		P
	For luminaires with adjustable beam angle the most severe condition is selected for each assessment.	Light Source without adjustable beam angle function was assessed in this test report	N/A
	The evaluation of a luminaire is understood to mean the evaluation of a luminaire with the intended normal use of the specified light sources or with the light sources installed. For the selection of light sources IEC 60598-1:2020, Annex B is used.	Light Source was assessed in this test report.	N/A
5	ACTINIC UV HAZARDS EXPOSURE FOR SKIN AND EYE (200 NM TO 400 NM)		P
5.2	Actinic UV assessment for light sources		P
	Calculated value of $K_{S,v}$ based on irradiance measurements specified in IEC 62471		P
	Light sources classification according one of the following ranges..... : a) $K_{S,v} \leq 2 \text{ mW} \cdot \text{klm}^{-1}$ b) $2 \text{ mW} \cdot \text{klm}^{-1} < K_{S,v} \leq 6 \text{ mW} \cdot \text{klm}^{-1}$ c) $K_{S,v} > 6 \text{ mW} \cdot \text{klm}^{-1}$	Range a	—
5.3	Actinic UV assessment for luminaires		N/A
	The ultraviolet hazard efficacy of luminous radiation $K_{S,v}$ of luminaires does not exceed $2 \text{ mW} \cdot \text{klm}^{-1}$.		N/A
	The luminaire operate with light sources whose evaluation has resulted in a value $K_{S,v}$ of $\leq 2 \text{ mW} \cdot \text{klm}^{-1}$		N/A
	The luminaires operates with light sources whose evaluation has resulted in a value $2 \text{ mW} \cdot \text{klm}^{-1} < K_{S,v} \leq 6 \text{ mW} \cdot \text{klm}^{-1}$ and is provided with a protective shield		N/A
	The luminaire operates with light sources whose evaluations have resulted in a value exceeding $K_{S,v} = 6 \text{ mW} \cdot \text{klm}^{-1}$ and is provided with a protective shield or front glass		N/A
	The luminaires does not generate an actinic UV irradiance E_s higher than $0,001 \text{ W} \cdot \text{m}^{-2}$ when assessed in accordance with IEC 62471:2006 at 200 mm distance		N/A
6	UV-A HAZARD ASSESSMENT FOR THE EYE LENS (315 NM TO 400 NM)		P
6.2	UV-A light source and luminaire assessment		P
	For light sources and luminaires for general lighting, no intentional UV-A is added to the visible light		P

IEC 62471-7			
Clause	Requirement + Test	Result - Remark	Verdict
	For light sources and luminaires where UV-A is intentionally added to the visible light, the calculated value of $K_{UV-A,V}$ does not exceed $20 \text{ W} \cdot \text{klm}^{-1}$		N/A
	The luminaire does not generate an irradiance E_{UV-A} higher than $10 \text{ W} \cdot \text{m}^{-2}$ when assessed in accordance with IEC 62471:2006 at 200 mm distance		N/A
7	RETINAL BLUE LIGHT HAZARD ASSESSMENT (300 NM TO 700 NM)		P
7.2	Blue light hazard assessment for light sources		P
	Light source are evaluated according to the methodology described in IEC 62471 and provided for an assessment distance of 200 mm and FOV of 1,7 mrad		P
	The light sources are operated and evaluated under conditions with the highest luminous flux		N/A
	Alternative the lamp is assessed with a FOV of 11 mrad at 200 mm distance		N/A
	The technical documentation of the light sources indicates one of the following:		P
	– The maximum blue light hazard radiance measured under the above conditions		P
	– The corresponding application group for the luminaires according to Table 2		N/A
7.3	Blue light hazard assessment for luminaires		N/A
	Luminaire application group		—
	Assessment distance		—
	Measured emission level		—
	Application group of classified light source		—
	For application group BLH-D: Distance at which at least the emission level of BLH-C is observed.....		—
	Luminaire complies with the emission limits given in Table 2 relevant to that application group		N/A
8	RETINAL THERMAL HAZARD ASSESSMENT (380 NM TO 1 400 NM)		N/A
8.2	Retinal thermal hazard for light source assessment		N/A
	For light sources not exceeding a retinal thermal radiance L_R of $280\,000 \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$; no retinal thermal hazard		N/A
	For white light sources if the blue light hazard radiance L_B is lower than $100\,000 \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$; no retinal thermal hazard		N/A

IEC 62471-7			
Clause	Requirement + Test	Result - Remark	Verdict
	For light sources exceeding a retinal thermal radiance L_R of $280\,000\text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$. L_R of the light source provided for an assessment distance of 200 mm and a FOV of 1,7 mrad..... :	Since L_R is more than $280\,000\text{ W/m}^2\text{sr}$ a further evaluation on the final product (luminaire) is needed to address Retinal Thermal Hazard.	—
8.3	Retinal thermal hazard assessment for luminaire		N/A
	Luminaire with light source with L_R smaller than $280\,000\text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$ or a white light source where the blue light hazard radiance L_B is lower than $100\,000\text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$; no retinal thermal hazard		N/A
	Luminaire with light source with L_R exceeding $280\,000\text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$ measured retinal thermal radiance is lower than the relevant emission limits according IEC 62471-5 at an assessment distance of 1 000 mm; no retinal thermal hazard		N/A
	In case the emission limits at 1 000 mm are exceeded, the measured or calculated distance beyond which the retinal thermal radiance L_R is below the emission limit		—
9	INFRARED HAZARD ASSESSMENT FOR THE EYE (780 NM TO 3 000 NM)		P
9.2	Light source and luminaire assessment		P
	For light sources and luminaires, no intentional IR radiation is added to the visible light		P
	For light sources and luminaires where IR radiation is intentionally added to the visible light, the calculated value of $K_{R,V}$ does not exceed $200\text{ W} \cdot \text{klm}^{-1}$		N/A

IEC 62471-7				
Clause	Requirement + Test		Result - Remark	Verdict
		Sample identification list		
Measurement performed on		<input checked="" type="checkbox"/> Light Source <input type="checkbox"/> Luminaire		
Model number :		L1HX-65702V0000000		
Test voltage (V) :		3.55		
Test current (mA) :		2500		
Power (W) :		8.88		
Test frequency (Hz) :		-		
Ambient, t(°C) :		24.5 °C		
Measurement distance :		200 mm		
Field of view :		1,7 mrad		
Item	List of Tests	Limit Value	Measurement Value	Test Result
1	Ultraviolet Hazard Efficacy Test	N/A	0.177 mW/klm	Range a
2	UV-A Hazard Efficacy Test	≤20 W/klm	0.001 W/klm	Pass
3	Infrared Eye Hazard Efficacy Test	≤200 W/klm	0.165 W/klm	Pass
4	Blue Light Hazard Test	N/A	159305.844 W/m²sr	BLH-C
5	Retinal Thermal Hazard	≤280000 W/m²sr	401234.844 W/m²sr	Above limit

		Sample identification list		
Measurement performed on		<input checked="" type="checkbox"/> Light Source <input type="checkbox"/> Luminaire		
Model number :		L1HX-65702V0000000		
Test voltage (V) :		2.71		
Test current (mA) :		130		
Power (W) :		0.35		
Test frequency (Hz) :		-		
Ambient, t(°C) :		24.5 °C		
Measurement distance :		200 mm		
Field of view :		1,7 mrad		
Item	List of Tests	Limit Value	Measurement Value	Test Result
1	Ultraviolet Hazard Efficacy Test	N/A	0.015 mW/klm	Range a
2	UV-A Hazard Efficacy Test	≤20 W/klm	0.000 W/klm	Pass
3	Infrared Eye Hazard Efficacy Test	≤200 W/klm	3.84 W/klm	Pass
4	Blue Light Hazard Test	N/A	9838.774 W/m²sr	BLH-A
5	Retinal Thermal Hazard	≤280000 W/m²sr	27827.127 W/m²sr	Pass

IEC 62471-7			
Clause	Requirement + Test	Result - Remark	Verdict

		Sample identification list		
Measurement performed on		<input checked="" type="checkbox"/> Light Source <input type="checkbox"/> Luminaire		
Model number :		L1HX-40702V0000000		
Test voltage (V) :		3.63		
Test current (mA) :		2500		
Power (W) :		9.0		
Test frequency (Hz) :		-		
Ambient, t (°C) :		24.5 °C		
Measurement distance :		200 mm		
Field of view :		1,7 mrad		
Item	List of Tests	Limit Value	Measurement Value	Test Result
1	Ultraviolet Hazard Efficacy Test	N/A	0.036 mW/klm	Range a
2	UV-A Hazard Efficacy Test	≤20 W/klm	0.000 W/klm	Pass
3	Infrared Eye Hazard Efficacy Test	≤200 W/klm	0.161 W/klm	Pass
4	Blue Light Hazard Test	N/A	103975.906 W/m ² sr	BLH-C
5	Retinal Thermal Hazard	≤280000 W/m ² sr	392353.438 W/m ² sr	Above limit

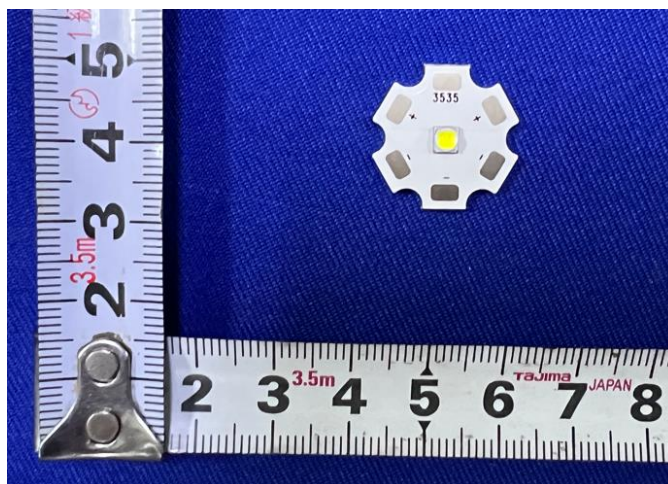
		Sample identification list		
Measurement performed on		<input checked="" type="checkbox"/> Light Source <input type="checkbox"/> Luminaire		
Model number :		L1HX-40702V0000000		
Test voltage (V) :		3.72		
Test current (mA) :		2400		
Power (W) :		8.92		
Test frequency (Hz) :		-		
Ambient, t (°C) :		24.5 °C		
Measurement distance :		200 mm		
Field of view :		1,7 mrad		
Item	List of Tests	Limit Value	Measurement Value	Test Result
1	Ultraviolet Hazard Efficacy Test	N/A	0.05 mW/klm	Range a
2	UV-A Hazard Efficacy Test	≤20 W/klm	0.000 W/klm	Pass
3	Infrared Eye Hazard Efficacy Test	≤200 W/klm	0.122 W/klm	Pass
4	Blue Light Hazard Test	N/A	90727.18 W/m ² sr	BLH-B
5	Retinal Thermal Hazard	≤280000 W/m ² sr	391660.813 W/m ² sr	Above limit

	Enclosure 1: Components List	
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The following components were found in the tested sample:			
Component	Manufacturer	Type model	Technical data
LED Chip	Lumileds	LXCL-E727-0001	Vmax 3.1V, Imax 500mA CRI 70, CCT 5500K

Enclosure 2: Photographs	
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Photograph No. 1 –Detail of model L1HX-65702V0000000



Photograph No. 2 – Detail of model L1HX-40702V0000000

