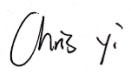



Test Location Information	
Name	UL-CCIC Company Limited
Address	No.2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122 China
Client Information	
Name	Lumileds (Shanghai) Management Co., Ltd.
Address	Building 1-A, No. 19 & 20, Lane 299, Wenshui Road, Jingan District, Shanghai, 200072, China
Report Information	
Report Number	4791663937_1
Report Date	2025-04-03
Standard References	IEC 62471-7:2023, Photobiological safety of lamps and lamp systems - Part 7: Light sources and luminaires primarily emitting visible radiation
Product Information	
Type	Built-in LED Package
Product Model	L1HX-AABBV0000000 (see GPI for type designation)
Electronic Parameter	I _{max} 2.5A --- (see GPI for further ratings)
Project Handler/Engineer	
Name/Signature	Chris Yi 
Review	
Name/Signature	Luca Nobile 
Remark	When the optical characteristic of the LED or any optical components are changed, re-measurement or further consideration should be necessary.

General Information

Information conveyed by this Report applies only to the test sample(s) actually tested. UL LLC did not select the sample(s), determine whether the sample(s) was representative of production sample(s), nor was UL provided with information relative to the formulation or identification of component materials used in the test sample(s).

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The report states that the report shall not be copy in whole or in part without the approval of the laboratory.

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.		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.		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) $K_{S,v} > 6 \text{ mW} \cdot \text{klm}^{-1}$		—
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
	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
	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 $K_{IR,V}$ does not exceed $200\text{ W} \cdot \text{klm}^{-1}$		N/A

Table 1 – Optical radiation hazards covered in this document

Optical radiation hazard	Target tissue	Weighting function ^a	Wavelength range nm	Assessed quantity	Symbol for emission level	Unit
Actinic UV	Skin and anterior tissues of the eye	$S_{UV}(\lambda)$	200 to 400	Irradiance	E_s	$W \cdot m^{-2}$
UV-A	Lens	N/A	315 to 400	Irradiance	E_{UV-A}	$W \cdot m^{-2}$
Blue light	Retina	$B(\lambda)$	300 to 700	Radiance	L_B	$W \cdot m^{-2} \cdot sr^{-1}$
Blue light, small source	Retina	$B(\lambda)$	300 to 700	Irradiance	E_B	$W \cdot m^{-2}$
Retinal thermal	Retina	$R(\lambda)$	380 to 1 400	Radiance	L_R	$W \cdot m^{-2} \cdot sr^{-1}$
Retinal thermal, weak visual stimulus	Retina	$R(\lambda)$	780 to 1 400	Radiance	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$
Infrared	Anterior tissues of the eye	N/A	780 to 3 000	Irradiance	E_{IR}	$W \cdot m^{-2}$
Visible and infrared	Skin	N/A	380 to 3 000	Irradiance	E_H	$W \cdot m^{-2}$
^a The weighting functions for $S_{UV}(\lambda)$ and $B(\lambda)$ are defined in IEC 62471:2006 and the weighting function for $R(\lambda)$ in IEC 62471-5:2015.						

Table 2 – Application-related blue light radiance emission limits at assessment distances for luminaires

Application group	Blue light hazard radiance emission limit ^c L_B	Assessment distance ^b mm	Luminaire groups of application ^a
BLH-A	10 000 W · m ⁻² · sr ⁻¹	200	<ul style="list-style-type: none">• mains socket outlet mounted nightlights• portable luminaires for children• luminaires used in clinical areas of hospitals and health care buildings (other than ceiling and/or recessed luminaires)
		1 000	<ul style="list-style-type: none">• signal luminaire• light-signalling devices for vehicles and their trailers• road signs• emergency safety signs
BLH-B	100 000 W · m ⁻² · sr ⁻¹	200	<ul style="list-style-type: none">• handlamps• portable luminaires• table luminaires• lighting chains• rope lights• wall luminaires• suspended luminaires office and home use• aquarium luminaires• luminaires for swimming pools and similar applications• interior lighting of vehicles (installed in the passenger compartment)• ground recessed luminaires (accessible areas, see IEC 60598-2-13:2006, Annex A and IEC 60598-2-13:2006/AMD2:2016, Annex A)
		1 000	<ul style="list-style-type: none">• ceiling and/or recessed lighting equipment• shop-lighting• luminaires for road and street lighting• uplighter• flood lighting• ground recessed luminaires (non-accessible areas, see IEC 60598-2-13:2006, Annex A and IEC 60598-2-13:2006/AMD2:2016, Annex A)
BLH-C ^d	4 000 000 W · m ⁻² · sr ⁻¹	1 000	<ul style="list-style-type: none">• luminaire for stage lighting• television and film studio• road illumination and road projection devices for vehicles
BLH-D ^d	If the emission level of 4 000 000 W · m ⁻² · sr ⁻¹ is exceeded.	Application group BLH-D is not acceptable for any luminaires within the scope of this document. Thermal limit assessment distance shall be determined at which at least the emission level to BLH-C is observed.	

^a If the final product does not fit any of these descriptions, the flow chart in Figure C.1 can be applied to determine the application group. Figure C.1 is considered as normative in this case.

^b For fixed luminaires the assessment distance may be increased when this is appropriate for the application of the specific luminaire. In this case information for the assessment distance used shall be provided as the minimum distance in the installation instructions of the luminaire.

^c For the background of the blue light radiance emission limits, see Annex C.

^d The retinal thermal limits shall be considered.

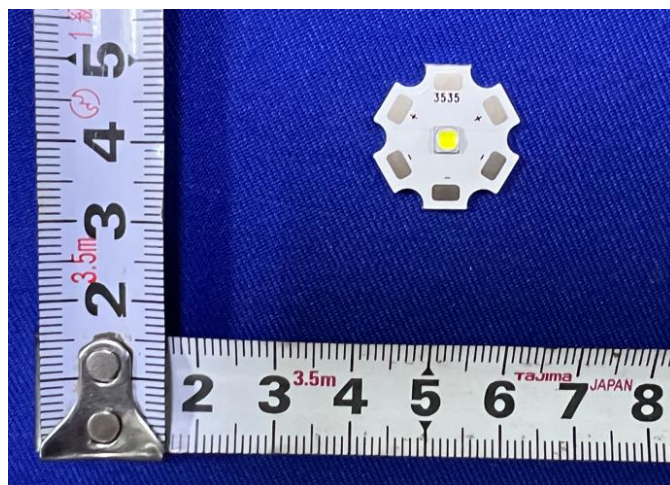
Table 3 “List of tests”

Appendix	Page
Detailed Testing Data	10-13
Instrument reference list	14

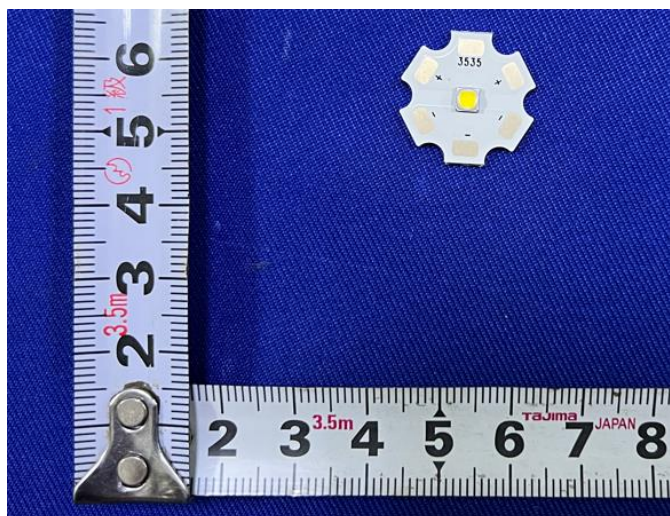
Table 4 “Appendix”

Sample Identification			
No.	Sample Identification Number	Date Received	Product Description /Serial Number
1	8110746	2025-03-17	L1HX-40702V0000000
2	8110748	2025-03-17	L1HX-65702V0000000
Photos of Sample			

Photograph No. 1 –Detail of model L1HX-65702V0000000



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



Marking Plate

 LUMILEDS
L1HX-65702V0000000

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

General product information

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 – A A B B 2CZZZZZZZ

Where

A A: 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)

B B: 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)	1800 K	2200 K	2700 K	3000 K	3500 K	4000 K	5000 K	5700 K	6500 K
L1HX-AABB2CZZZZZZZ	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 provided 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. Install the sample into the holder, with the back close to the heat sink for testing.
2. Simple Acceptance decision rule is applied when risk level is classified for the measurement result of the sample received.

Detailed Test Data

Tested by:	Marin Liu	Sample Tested:	2025-03-17
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Test Result

Table 3		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

Table 3		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

Table 3		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/m²sr	BLH-C
5	Retinal Thermal Hazard	≤280000 W/m²sr	392353.438 W/m²sr	Above limit

Table 3		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/m²sr	BLH-B
5	Retinal Thermal Hazard	≤280000 W/m²sr	391660.813 W/m²sr	Above limit

Appendix – Instrument reference list

Instrument ID	Equipment Type	Calibration date	
		Last	Due
183145	Temperature and Humidity Datalogger	2024/06/12	2025/06/12
222346	Power Analyzer	2024/08/14	2025/08/14
222344	Photobiological radiation safety test system	-	-
156217	Measuring Tape	2024/08/15	2025/08/15
222353	Spectral Photometer Detector	2024/08/14	2025/08/14
222354	Power Source	2024/07/25	2025/07/25
222365	Standard lamp of ultraviolet radiation	2024/07/26	2025/07/26
222352	Spectral irradiance lamp	2024/07/26	2025/07/26

Table 4 Instrument reference list

Report No:
Report Date:

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