



JEISOON KANG
HANWHA TECHWIN CO LTD
6, PANGYO-RO 319BEON-GIL, BUNDANG-GU
SEONGNAM-SI GYEONGGI-DO 13488 KOREA

Date: 2020/10/02
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Project No: 4789644303
PD No: 20048157
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PO Number: KANG, JEISOON

Subject: **Procedure And/Or Report Material**

The following material resulting from the investigation under the above numbers is enclosed.

Issue

<u>Date</u>	<u>Vol</u>	<u>Sec</u>	<u>Pages</u>	<u>Revised Date</u>
2019/02/20	X1	A244	Revised Proc/Rpt Section	

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NOTE: Follow-Up Service Procedure revisions DO NOT include Cover Pages, Test Records and Conclusion Pages. Report revisions DO NOT include Authorization Pages, Indices, Section General Pages and Appendixes.

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UL TEST REPORT AND PROCEDURE

Standard:	UL 60950-1, 2nd Edition, 2019-05-09 (Information Technology Equipment - Safety - Part 1: General Requirements) CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10 (Information Technology Equipment - Safety - Part 1: General Requirements)
Certification Type:	Listing
CCN:	NWGQ, NWGQ7 (Information Technology Equipment Including Electrical Business Equipment)
Complementary CCN:	N/A
Product:	ANALOG CAMERA
Model:	HCD-6020R, HCD-6010
Rating:	12 Vdc , 0.45 A for Model HCD-6020R, 12 Vdc , 0.3 A for Model HCD-6010.
Applicant Name and Address:	HANWHA TECHWIN CO LTD 6, PANGYO-RO 319BEON-GIL, BUNDANG-GU SEONGNAM-SI KOREA, REPUBLIC OF

This is to certify that representative samples of the products covered by this Test Report have been investigated in accordance with the above referenced Standards. The products have been found to comply with the requirements covering the category and the products are judged to be eligible for Follow-Up Service under the indicated Test Procedure. The manufacturer is authorized to use the UL Mark on such products which comply with this Test Report and any other applicable requirements of UL LLC ('UL') in accordance with the Follow-Up Service Agreement. Only those products which properly bear the UL Mark are considered as being covered by UL's Follow-Up Service under the indicated Test Procedure.

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Prepared By: Sam Park / Project Handler

Reviewed By: SeulKi Park / Reviewer

Supporting Documentation

The following documents located at the beginning of this Procedure supplement the requirements of this Test Report:

A. Authorization - The Authorization page may include additional Factory Identification Code markings.

B. Generic Inspection Instructions -

- i. Part AC details important information which may be applicable to products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of this Test Report.
- ii. Part AE details any requirements which may be applicable to all products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of each Test Report.
- iii. Part AF details the requirements for the UL Certification Mark which is not controlled by the technical standard used to investigate these products. Products are permitted to bear only the Certification Mark(s) corresponding to the countries for which it is certified, as indicated in each Test Report.

Product Description

ANALOG CAMERA intended for indoor use.

Electronic components were mounted on PWB and housed in plastic enclosure and supplied by 12 Vdc (Supplied by SELV, LPS)

Model Differences

- Basic model is HCD-6020R. (LED board)

- Model HCD-6010 is identical to basic model HCD-6020R except for LED board and Transparent Cover Enclosure (Plastic). (No LED board)

model	Transparent Cover Enclosure (Plastic)
HCD-6010	143R(f1)
HCD-6020R	HF1130R(f2)

Test Item Particulars

Equipment mobility	Fixed
Connection to the mains	N/A
Operating condition	continuous
Access location	operator accessible
Over voltage category (OVC)	OVC I
Mains supply tolerance (%) or absolute mains supply values	No direct connection
Tested for IT power systems	No
IT testing, phase-phase voltage (V)	N/A
Class of equipment	Class III (supplied by SELV)
Considered current rating of protective device as part of the building installation (A)	N/A
Pollution degree (PD)	PD 2
IP protection class	IP X0
Altitude of operation (m)	less than 2000 meters
Altitude of test laboratory (m)	less than 2000 meters

Mass of equipment (kg)	0.23												
Technical Considerations - The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of : 55 °C - The following are available from the Applicant upon request : Installation (Safety) Instructions / Manual - The product was investigated to the following additional standards : IEC 62471 - The following circuit locations (with circuit/schematic designation) were investigated as a limited power source (LPS) : All outputs													
Additional Information Original (4788858311) - Maximum normal load: Continuous operation. Revision (4789644303) -Change Transparent Cover Enclosure (Plastic) for model HCD-6010 From R/C (QMFZ2), SABIC INNOVATIVE PLASTICS B V (E45329), Model No. HF1130R(f2) To R/C (QMFZ2), SABIC INNOVATIVE PLASTICS B V (E45329), Model No. 143R(f1)													
Additional Standards The product fulfills the requirements of: N/A													
Markings and Instructions <table border="1"> <thead> <tr> <th>Clause Title</th> <th>Marking or Instruction Details</th> </tr> </thead> <tbody> <tr> <td>Power rating - Ratings</td> <td>Ratings (voltage, frequency/dc, current)</td> </tr> <tr> <td>Power rating - Company identification</td> <td>Listee's or Recognized companys name, Trade Name, Trademark or File Number</td> </tr> <tr> <td>Power rating - Model</td> <td>Model Number</td> </tr> <tr> <td>Fuses - Rating</td> <td>Rated current and voltage and type located on or adjacent to fuse or fuseholder.</td> </tr> <tr> <td>Manual -1</td> <td>This product is intended to be supplied by a Listed Power Supply Unit marked "Class 2" or "LPS" and rated from 12 Vdc, min.0.45 A.</td> </tr> </tbody> </table>		Clause Title	Marking or Instruction Details	Power rating - Ratings	Ratings (voltage, frequency/dc, current)	Power rating - Company identification	Listee's or Recognized companys name, Trade Name, Trademark or File Number	Power rating - Model	Model Number	Fuses - Rating	Rated current and voltage and type located on or adjacent to fuse or fuseholder.	Manual -1	This product is intended to be supplied by a Listed Power Supply Unit marked "Class 2" or "LPS" and rated from 12 Vdc, min.0.45 A.
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Special Instructions to UL Representative N/A													

BD1.0	TABLE: Production-Line Testing Requirements					
BD1.1	Electric Strength Test Special Constructions – Refer to Generic Inspection Instructions, Part AC for further information.					
Model	Component	Removable parts	Test probe location	Test V rms	Test V dc	Test Time, s
N/A	N/A	N/A	N/A	N/A	N/A	N/A
BD1.2	Earthing Continuity Test Exemptions – This test is not required for the following models:					
	All models					
BD1.3	Electric Strength Test Exemptions – This test is not required for the following models:					
	All models					
BD1.4	Electric Strength Test Component Exemptions – The following solid-state components may be disconnected from the remainder of the circuitry during the performance of this test:					

BE1.0	Sample and Test Specifics for Follow-Up Tests at UL				
Model	Component	Material	Test	Sample (s)	Test Specifics

1.5.1	TABLE: List of critical components					Pass
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Product Category CCN(s)	Mark(s) of conformity	Supplement ID
Transparent Cover Enclosure (Plastic) for model HCD- 6020R	SABIC INNOVATIVE PLASTICS B V	HF1130R(f2)	Min. 1.5 mm thickness, rated V-2, 130 deg. C, See enclosure for dimension.	QMFZ2	UL (E45329)	
Transparent Cover Enclosure (Plastic) for model HCD-6010	SABIC INNOVATIVE PLASTICS B V	143R(f1)	Min. 1.5 mm thick, rated HB, 125 deg. C, See enclosure for dimension.	QMFZ2	UL (E45329)	
External Enclosure (White)	LOTTE ADVANCED MATERIALS CO LTD	HN-1064(+)	Min. 1.5 mm thickness, rated V-0, 130 deg. C, See enclosure for dimension.	QMFZ2	UL (E115797)	
External Rear Enclosure (Black)	LOTTE ADVANCED MATERIALS CO LTD	NH-1035(+)	Min. 1.5 mm thickness, rated V-0, 80 deg. C.	QMFZ2	UL (E115797)	
Internal Enclosure (Black)	LOTTE ADVANCED MATERIALS CO LTD	NH-1035(+)	Min. 1.5 mm thickness, rated V-0, 80 deg. C.	QMFZ2	UL (E115797)	
LED	SHENZHEN CHUANGSHIJI OPTOELECTRONI CS CO.,LTD	850-HIR5S 80° black	VF =Max. 1.8 VIF=80 mA, 12 EA	-	-	
Fuse (F2)	LITTELFUSE INC	437*	63 V, 1 A	JDYX2/8	UL (E10480)	
Connectors and Receptacles (Secondary circuits)	Interchangeable	Interchangeable	-	ECBT2 or RTRT2	UL	
(Alternate)	Interchangeable	Interchangeable	Copper alloy pins housed in bodies of plastic rated Min. V-2	QMFZ2	UL	

Internal Wiring (Secondary)	Interchangeable	Interchangeable	FEP, PTFE, PVC, TFE, neoprene, polyimide or marked VW-1; Min. 30 V, 80 deg. C	AVLV2	UL	
Cable	Interchangeable	Interchangeable	FEP, PTFE, PVC, TFE, neoprene, polyimide or marked VW-1; Min. 30 V, 80 deg. C	AVLV2	UL	
PWB	Interchangeable	Interchangeable	Min. V-1, 105 deg. C.	ZPMV2	UL	
Label	Interchangeable	Interchangeable	Min.55 deg. C if max. surface temperature not specified.	PGDQ2 or PGJ12	UL	

Enclosures

Type	Supplement Id	Description
Photographs	03-08	Overall -1
Photographs	03-09	Overall -2
Photographs	03-10	Internal
Photographs	03-13	LED board (Top)
Photographs	03-14	LED board (Bottom)
Photographs	03-16	Main board (Top)
Photographs	03-17	Main board (Bottom)
Manuals	06-03	Manual
Miscellaneous	07-03	Enclosure dimension
Miscellaneous	07-04	Label
Miscellaneous	07-05	LED report

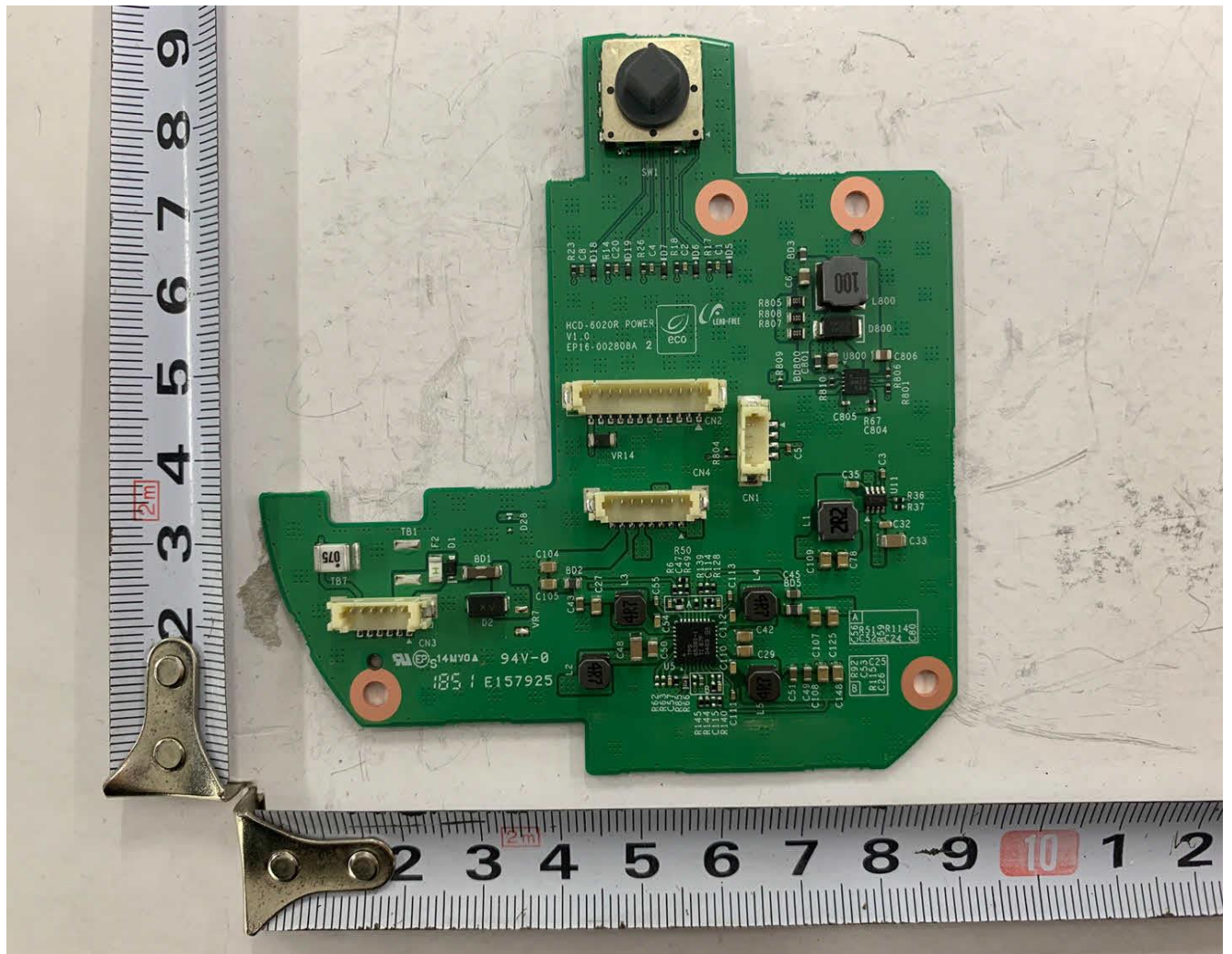


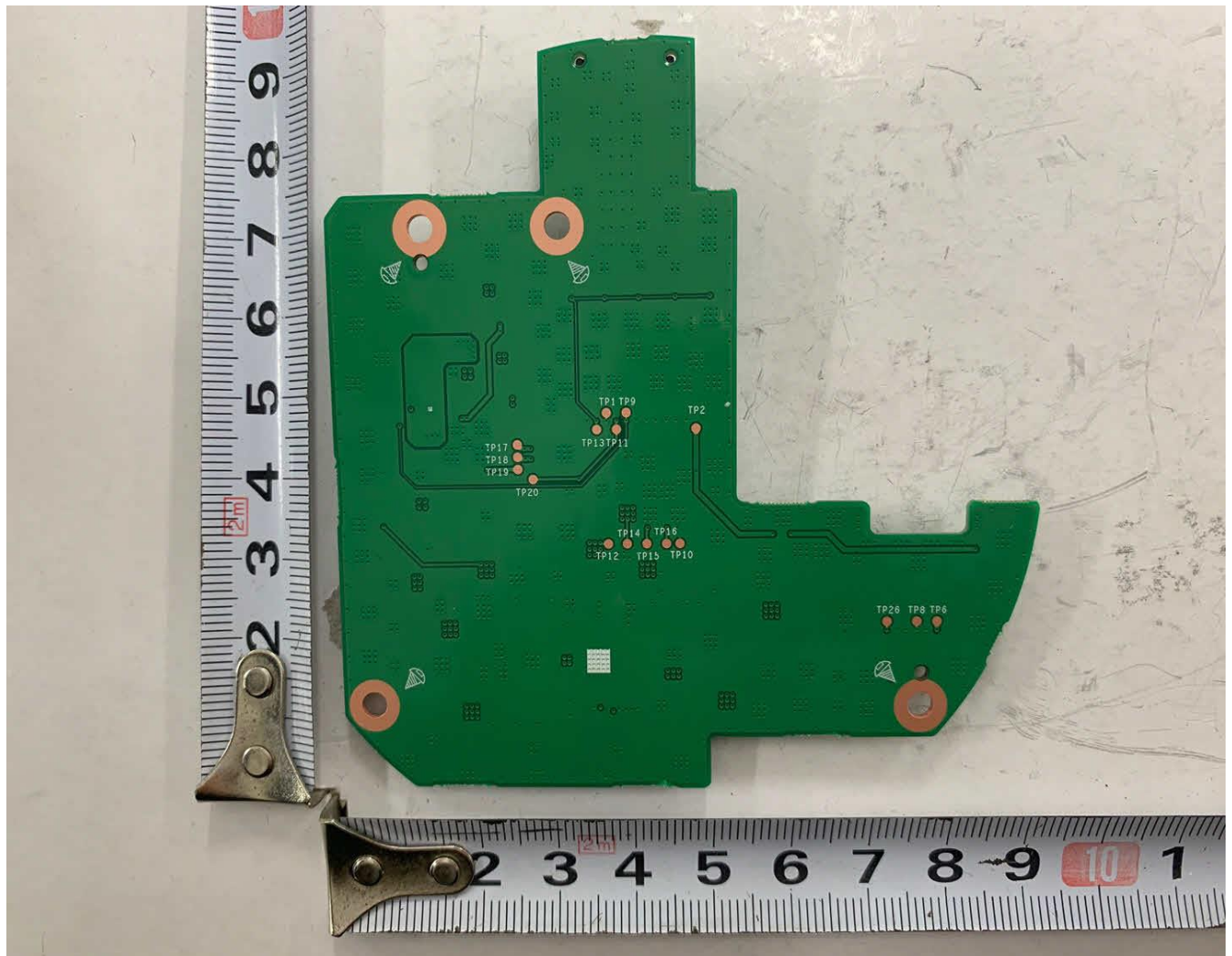












Important safety instructions

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus.
13. Unplug this apparatus when a card is used. Use caution when moving the cart/ apparatus combination to avoid injury from tip-over.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as powersupply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. This product is intended to be supplied by a Listed Power Supply Unit marked "Class 2" or "LPS" and rated from 12 Vdc, min.0.45A.
16. If you use excessive force when installing the product, the camera may be damaged and malfunction.
If you forcibly install the product using non-compliant tools, the product may be damaged.

● IMPORTANT SAFETY INSTRUCTIONS



Important safety instructions

17. Do not install the product in a place where chemical substances or oil mist exists or may be generated. As edible oils such as soybean oil may damage or warp the product, do not install the product in the kitchen or near the kitchen table.
This may cause damage to the product.
18. When installing the product, be careful not to allow the surface of the product to be stained with chemical substance.
Some chemical solvents such as cleaner or adhesives may cause serious damage to the product's surface.
19. If you install/disassemble the product in a manner that has not been recommended, the production functions/performance may not be guaranteed.
Install the product by referring to "Installation & connection" in the user manual.
20. Installing or using the product in water can cause serious damage to the product.

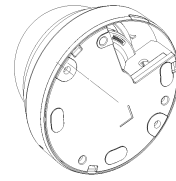
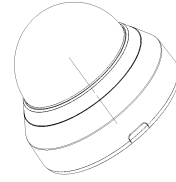
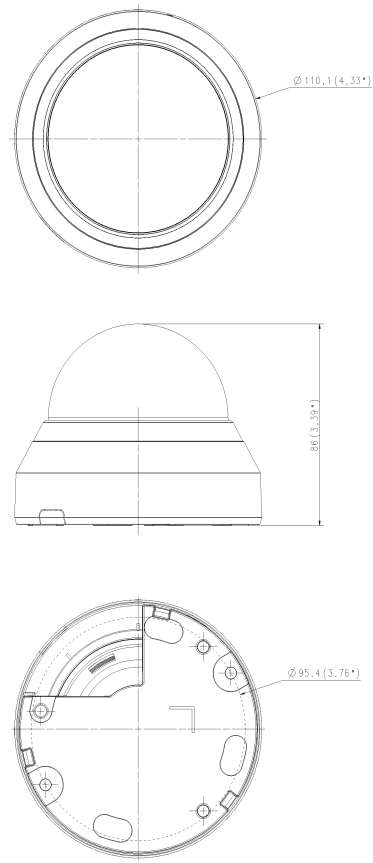


Apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the apparatus



Hanwha Techwin cares for the environment at all product manufacturing stages, and is taking measures to provide customers with more environmentally friendly products.

The Eco mark represents Hanwha Techwin's devotion to creating environmentally friendly products, and indicates that the product satisfies the EU RoHS Directive.



SCD-6023R
Appearance Drawing
Unit:mm(inch)

MODEL: HCD-6020R

DC 12V  0.45A

M/C: HCD-6020R/KAN

Fac. ID: D



[DATE] S/N:[제조번호]

CAN ICES-3(A)/NMB-3(A)

HANWHA TECHWIN CO.,LTD.

MADE IN KOREA



MODEL: HCD-6010

DC 12V  0.3A

M/C: HCD-6010/KAN

Fac. ID: D



[DATE] S/N:[제조번호]

CAN ICES-3(A)/NMB-3(A)

HANWHA TECHWIN CO.,LTD.

MADE IN KOREA





Test Report issued under the responsibility of:



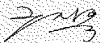
TEST REPORT IEC 62471 Photobiological safety of lamps and lamp systems	
Report Reference No.	16-006216-02
Date of issue	2016-02-25
Total number of pages	20 pages
CB Testing Laboratory	KTL (Korea Testing Laboratory)
Address	87, Digital-ro 26-gil, Guro-gu, Seoul, 08389, Rep. of Korea
Applicant's name	Hanwha Techwin Co., Ltd.
Address	1204, Changwondae-ro, Sungsan-gu, Changwon-si, Gyeongsangnam-do, Korea
Test specification:	
Standard	IEC 62471:2006 (First Edition) + European Group Difference and National Differences
Test procedure	N/A
Non-standard test method	N/A
Test Report Form No.	IEC62471A
TRF Originator	VDE Testing and Certification Institute
Master TRF	Dated 2009-05
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This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.	
Test item description	ANALOG CAMERA
Trade Mark	
Manufacturer	Same as applicant
Model/Type reference	SCD-6023R*
Ratings	DC12 V, 0.35A, Exempt Group

TRF No. IEC62471A



* 위 마크는 후부 전자확인용 마크 프로그램에서 원본대조시 사용되는 2D코드입니다.



Testing procedure and testing location:	
☒ CB Testing Laboratory:	KTL (Korea Testing Laboratory)
Testing location/ address	87, Digital-ro 26-gil, Guro-gu, Seoul, 08389, Rep. of Korea
☐ Associated CB Laboratory:	
Testing location/ address	
Tested by (name + signature)	Jae-Hoon Jung 
Approved by (+ signature)	JinWook Kwon 
☐ Testing procedure: TMP	
Tested by (name + signature)	
Approved by (+ signature)	
Testing location/ address	
☐ Testing procedure: WMT	
Tested by (name + signature)	
Witnessed by (+ signature)	
Approved by (+ signature)	
Testing location/ address	
☐ Testing procedure: SMT	
Tested by (name + signature)	
Approved by (+ signature)	
Supervised by (+ signature)	
Testing location/ address	
☐ Testing procedure: RMT	
Tested by (name + signature)	
Approved by (+ signature)	
Supervised by (+ signature)	
Testing location/ address	

TRF No. IEC62471A



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Summary of testing:	
Tests performed (name of test and test clause): - All clauses - by supplying DC12V to the model SCD-6023RN.	Testing location: KTL (Korea Testing Laboratory) 87, Digital-ro 26-gil, Guro-gu, Seoul, 08389, Rep. of Korea
Summary of compliance with National Differences: The sample(s) tested complies with the requirements of EN 62471:2008. See Attachment at the end of this report for compliance with European Group Difference and National Differences.	
Copy of marking plate: -	
Item covered Model SCD-6023R* (* mean N: NT & P: PAL) cover SCD-6083RN and SCD-6083RP	

TRF No. IEC62471A



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Test item particulars			
Tested lamp	☒ continuous wave lamps		☐ pulsed lamps
Tested lamp system	-		
Lamp classification group	☒ exempt	☐ risk 1	☐ risk 2 ☐ risk 3
Lamp cap	-		
Bulb	LED		
Rated of the lamp	-		
Furthermore marking on the lamp	-		
Seasoning of lamps according IEC standard	-		
Used measurement instrument	See page 15		
Temperature by measurement	23.1 °C		
Information for safety use	Not required		
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 : 2016-02-03			
Date (s) of performance of tests : 2016-02-03~ 02-25			
General remarks:			
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(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 comma (point) is used as the decimal separator. List of test equipment must be kept on file and available for review.			
General product information:			
- LED Package			
Manufacturer	Model	Rating	Color Rank
SHENZHEN CHUANGSHIJI OPTOELECTRONICS CO.,LTD	850-HIR5S 80° black	V _F =Max 1.8V I _F =80 mA	-

TRF No. IEC62471A



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IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
4	EXPOSURE LIMITS		
4.1	General		P
	The exposure limits in this standard is not less than 0,01 ms and not more than any 8-hour period and should be used as guides in the control of exposure		P
	Detailed spectral data of a light source are generally required only if the luminance of the source exceeds 10^4 cd m^{-2}	see clause 4.3	P
4.3	Hazard exposure limits		P
4.3.1	Actinic UV hazard exposure limit for the skin and eye		P
	The exposure limit for effective radiant exposure is 30 J m^{-2} within any 8-hour period		P
	To protect against injury of the eye or skin from ultraviolet radiation exposure produced by a broadband source, the effective integrated spectral irradiance, E_s , of the light source shall not exceed the levels defined by:		P
	$E_s \cdot t = \sum_{290}^{400} \sum_t E_\lambda(\lambda, t) \cdot S_{UV}(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 30 \quad \text{J m}^{-2}$		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		P
	$t_{\max} = \frac{30}{E_s} \quad \text{s}$		P
4.3.2	Near-UV hazard exposure limit for eye		P
	For the spectral region 315 nm to 400 nm (UV-A) the total radiant exposure to the eye shall not exceed 10000 J m^{-2} for exposure times less than 1000 s. For exposure times greater than 1000 s (approximately 16 minutes) the UV-A irradiance for the unprotected eye, E_{UVA} , shall not exceed 10 W m^{-2} .		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s, shall be computed by:		P
	$t_{\max} \leq \frac{10\,000}{E_{UVA}} \quad \text{s}$		P
4.3.3	Retinal blue light hazard exposure limit		P
	To protect against retinal photochemical injury from chronic blue-light exposure, the integrated spectral radiance of the light source weighted against the blue-light hazard function, $B(\lambda)$, i.e., the blue-light weighted radiance, L_B , shall not exceed the levels defined by:		P

TRF No. IEC62471A



IEC 62471			
Clause	Requirement + Test	Result - Remark	Verdict
	$L_B \cdot t = \sum_{300}^{700} L_{\lambda}(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 10^6 \quad \text{J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	for $t \leq 10^4 \text{ s}$ $t_{\max} = \frac{10^6}{L_B}$	P
	$L_B = \sum_{300}^{700} L_{\lambda} \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \quad \text{W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	for $t > 10^4 \text{ s}$	P
4.3.4	Retinal blue light hazard exposure limit - small source		P
	Thus the spectral irradiance at the eye E_{λ} , weighted against the blue-light hazard function $B(\lambda)$ shall not exceed the levels defined by:	see table 4.2	P
	$E_B \cdot t = \sum_{300}^{700} E_{\lambda}(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \quad \text{J} \cdot \text{m}^{-2}$		P
	$E_B = \sum_{300}^{700} E_{\lambda} \cdot B(\lambda) \cdot \Delta\lambda \leq 1 \quad \text{W} \cdot \text{m}^{-2}$		P
4.3.5	Retinal thermal hazard exposure limit		P
	To protect against retinal thermal injury, the integrated spectral radiance of the light source, L_{λ} , weighted by the burn hazard weighting function $R(\lambda)$ (from Figure 4.2 and Table 4.2), i.e., the burn hazard weighted radiance, shall not exceed the levels defined by:	see table 4.2	P
	$L_R = \sum_{380}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{50\,000}{\alpha \cdot t^{0.25}} \quad \text{W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	($10 \mu\text{s} \leq t \leq 10 \text{ s}$)	P
4.3.6	Retinal thermal hazard exposure limit – weak visual stimulus		N/A
	For an infrared heat lamp or any near-infrared source where a weak visual stimulus is inadequate to activate the aversion response, the near infrared (780 nm to 1400 nm) radiance, L_{IR} , as viewed by the eye for exposure times greater than 10 s shall be limited to:		N/A
	$L_{IR} = \sum_{780}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{6\,000}{\alpha} \quad \text{W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$		N/A
4.3.7	Infrared radiation hazard exposure limits for the eye		P
	The avoid thermal injury of the cornea and possible delayed effects upon the lens of the eye (cataractogenesis), ocular exposure to infrared radiation, E_{IR} , over the wavelength range 780 nm to 3000 nm, for times less than 1000 s, shall not exceed:		P
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 18\,000 \cdot t^{-0.75} \quad \text{W} \cdot \text{m}^{-2}$		P
	For times greater than 1000 s the limit becomes:		P

TRF No. IEC62471A



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IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 100 \quad W \cdot m^{-2}$		P
4.3.8	Thermal hazard exposure limit for the skin		N/A
	Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:		N/A
	$E_{H \cdot t} = \sum_{380}^{3000} \sum_t E_{\lambda}(\lambda, t) \cdot \Delta\lambda \cdot \Delta t \leq 20\,000 \cdot t^{0.25} \quad J \cdot m^{-2}$		N/A
5	MEASUREMENT OF LAMPS AND LAMP SYSTEMS		P
5.1	Measurement conditions		P
	Measurement conditions shall be reported as part of the evaluation against the exposure limits and the assignment of risk classification.		P
5.1.1	Lamp ageing (seasoning)		P
	Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.		P
5.1.2	Test environment		P
	For specific test conditions, see the appropriate IEC lamp standard or in absence of such standards, the appropriate national standards or manufacturer's recommendations.	manufacturer's recommendations.	P
5.1.3	Extraneous radiation	No extraneous radiation	P
	Careful checks should be made to ensure that extraneous sources of radiation and reflections do not add significantly to the measurement results.		P
5.1.4	Lamp operation		P
	Operation of the test lamp shall be provided in accordance with:		P
	– the appropriate IEC lamp standard, or		N/A
	– the manufacturer's recommendation		P
5.1.5	Lamp system operation		P
	The power source for operation of the test lamp shall be provided in accordance with:		N/A
	– the appropriate IEC standard, or		N/A
	– the manufacturer's recommendation		P
5.2	Measurement procedure		P
5.2.1	Irradiance measurements		P
	Minimum aperture diameter 7mm.		P
	Maximum aperture diameter 50 mm.		P

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IEC 62471			
Clause	Requirement + Test	Result - Remark	Verdict
	The measurement shall be made in that position of the beam giving the maximum reading.		P
	The measurement instrument is adequate calibrated.		P
5.2.2	Radiance measurements		P
5.2.2.1	Standard method		P
	The measurements made with an optical system.		P
	The instrument shall be calibrated to read in absolute radiant power per unit receiving area and per unit solid angle to acceptance averaged over the field of view of the instrument.		P
5.2.2.2	Alternative method		N/A
	Alternatively to an imaging radiance set-up, an irradiance measurement set-up with a circular field stop placed at the source can be used to perform radiance measurements.		N/A
5.2.3	Measurement of source size	24.3 mrad	P
	The determination of α , the angle subtended by a source, requires the determination of the 50% emission points of the source.		P
5.2.4	Pulse width measurement for pulsed sources	Continuous sources	N/A
	The determination of Δt , the nominal pulse duration of a source, requires the determination of the time during which the emission is > 50% of its peak value.		N/A
5.3	Analysis methods		P
5.3.1	Weighting curve interpolations		P
	To standardize interpolated values, use linear interpolation on the log of given values to obtain intermediate points at the wavelength intervals desired.	see table 4.1	P
5.3.2	Calculations		P
	The calculation of source hazard values shall be performed by weighting the spectral scan by the appropriate function and calculating the total weighted energy.		P
5.3.3	Measurement uncertainty		N/A
	The quality of all measurement results must be quantified by an analysis of the uncertainty.		N/A
6	LAMP CLASSIFICATION		
	For the purposes of this standard it was decided that the values shall be reported as follows:	see table 6.1	P

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Clause	Requirement + Test	Result - Remark	Verdict
	– for lamps intended for general lighting service, the hazard values shall be reported as either irradiance or radiance values at a distance which produces an illuminance of 500 lux, but not at a distance less than 200 mm		N/A
	– for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm		P
6.1	Continuous wave lamps		P
6.1.1	Except Group		P
	In the except group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not pose:	See table 6.1	P
	– an actinic ultraviolet hazard (E_S) within 8-hours exposure (30000 s), nor		P
	– a near-UV hazard (E_{UVA}) within 1000 s, (about 16 min), nor		P
	– a retinal blue-light hazard (L_B) within 10000 s (about 2,8 h), nor		P
	– a retinal thermal hazard (L_R) within 10 s, nor		P
	– an infrared radiation hazard for the eye (E_{IR}) within 1000 s		P
6.1.2	Risk Group 1 (Low-Risk)		N/A
	In this group are lamps, which exceeds the limits for the except group but that does not pose:		N/A
	– an actinic ultraviolet hazard (E_S) within 10000 s, nor		N/A
	– a near ultraviolet hazard (E_{UVA}) within 300 s, nor		N/A
	– a retinal blue-light hazard (L_B) within 100 s, nor		N/A
	– a retinal thermal hazard (L_R) within 10 s, nor		N/A
	– an infrared radiation hazard for the eye (E_{IR}) within 100 s		N/A
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 100 s are in Risk Group 1.		N/A
6.1.3	Risk Group 2 (Moderate-Risk)		N/A
	This requirement is met by any lamp that exceeds the limits for Risk Group 1, but that does not pose:		N/A
	– an actinic ultraviolet hazard (E_S) within 1000 s exposure, nor		N/A
	– a near ultraviolet hazard (E_{UVA}) within 100 s, nor		N/A
	– a retinal blue-light hazard (L_B) within 0,25 s		N/A

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	(aversion response), nor		
	— a retinal thermal hazard (L_R) within 0,25 s (aversion response), nor		N/A
	— an infrared radiation hazard for the eye (E_{IR}) within 10 s		N/A
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 10 s are in Risk Group 2.		N/A
6.1.4	Risk Group 3 (High-Risk)		N/A
	Lamps which exceed the limits for Risk Group 2 are in Group 3.		N/A
6.2	Pulsed lamps		N/A
	Pulse lamp criteria shall apply to a single pulse and to any group of pulses within 0,25 s.		N/A
	A pulsed lamp shall be evaluated at the highest nominal energy loading as specified by the manufacturer.		N/A
	The risk group determination of the lamp being tested shall be made as follows:		N/A
	— a lamp that exceeds the exposure limit shall be classified as belonging to Risk Group 3 (High-Risk)		N/A
	— for single pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance dose is below the EL shall be classified as belonging to the Exempt Group		N/A
	— for repetitively pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance dose is below the EL, shall be evaluated using the continuous wave risk criteria discussed in clause 6.1, using time averaged values of the pulsed emission		N/A

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IEC 62471			
Clause	Requirement + Test	Result - Remark	Verdict

Table 4.1 Spectral weighting function for assessing ultraviolet hazards for skin and eye			N/A
Wavelength ¹ λ , nm	UV hazard function $S_{uv}(\lambda)$	Wavelength λ , nm	UV hazard function $S_{uv}(\lambda)$
200	0.030	313*	0.006
205	0.051	315	0.003
210	0.075	316	0.0024
215	0.095	317	0.0020
220	0.120	318	0.0016
225	0.150	319	0.0012
230	0.190	320	0.0010
235	0.240	322	0.00067
240	0.300	323	0.00054
245	0.360	325	0.00050
250	0.430	328	0.00044
254*	0.500	330	0.00041
255	0.520	333*	0.00037
260	0.650	335	0.00034
265	0.810	340	0.00028
270	1.000	345	0.00024
275	0.960	350	0.00020
280*	0.880	355	0.00016
285	0.770	360	0.00013
290	0.640	365*	0.00011
295	0.540	370	0.000093
297*	0.460	375	0.000077
300	0.300	380	0.000064
303*	0.120	385	0.000053
305	0.060	390	0.000044
308	0.026	395	0.000036
310	0.015	400	0.000030

¹ Wavelengths chosen are representative; other values should be obtained by logarithmic interpolation at intermediate wavelengths.
* Emission lines of a mercury discharge spectrum.

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Clause	Requirement + Test	Result – Remark	Verdict
Table 4.2	Spectral weighting functions for assessing retinal hazards from broadband optical sources		P
Wavelength nm	Blue-light hazard function B (λ)	Burn hazard function R (λ)	
300	0,01		
305	0,01		
310	0,01		
315	0,01		
320	0,01		
325	0,01		
330	0,01		
335	0,01		
340	0,01		
345	0,01		
350	0,01		
355	0,01		
360	0,01		
365	0,01		
370	0,01		
375	0,01		
380	0,01	0,1	
385	0,013	0,13	
390	0,025	0,25	
395	0,05	0,5	
400	0,10	1,0	
405	0,20	2,0	
410	0,40	4,0	
415	0,80	8,0	
420	0,90	9,0	
425	0,95	9,5	
430	0,98	9,8	
435	1,00	10,0	
440	1,00	10,0	
445	0,97	9,7	
450	0,94	9,4	
455	0,90	9,0	
460	0,80	8,0	
465	0,70	7,0	
470	0,62	6,2	
475	0,55	5,5	
480	0,45	4,5	
485	0,40	4,0	
490	0,22	2,2	
495	0,16	1,6	
500-600	$10^{[(450-\lambda)/50]}$	1,0	
600-700	0,001	1,0	
700-1050		$10^{[(700-\lambda)/50]}$	
1050-1150		0,2	
1150-1200		$0,2 \cdot 10^{[0,02(1150-\lambda)]}$	
1200-1400		0,02	

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Table 5.4 Summary of the ELs for the surface of the skin or cornea (irradiance based values)					N/A
Hazard Name	Relevant equation	Wavelength range nm	Exposure duration sec	Limiting aperture rad (deg)	EL in terms of constant irradiance $W \cdot m^{-2}$
Actinic UV skin & eye	$E_S = \sum E_\lambda \cdot S(\lambda) \cdot \Delta\lambda$	200 – 400	< 30000	1,4 (80)	30/t
Eye UV-A	$E_{UVA} = \sum E_\lambda \cdot \Delta\lambda$	315 – 400	≤ 1000 > 1000	1,4 (80)	10000/t 10
Blue-light small source	$E_B = \sum E_\lambda \cdot B(\lambda) \cdot \Delta\lambda$	300 – 700	≤ 100 > 100	< 0,011	100/t 1,0
Eye IR	$E_{IR} = \sum E_\lambda \cdot \Delta\lambda$	780 – 3000	≤ 1000 > 1000	1,4 (80)	18000/t ^{0.75} 100
Skin thermal	$E_H = \sum E_\lambda \cdot \Delta\lambda$	380 – 3000	< 10	2π sr	20000/t ^{0.75}

Table 5.5 Summary of the ELs for the retina (radiance based values)					P
Hazard Name	Relevant equation	Wavelength range nm	Exposure duration sec	Field of view radians	EL in terms of constant radiance $W \cdot m^{-2} \cdot sr^{-1}$
Blue light	$L_B = \sum L_\lambda \cdot B(\lambda) \cdot \Delta\lambda$	300 – 700	0,25 – 10 10-100 100-10000 ≥ 10000	$0,011 \cdot \sqrt{(t/10)}$ 0,011 $0,0011 \cdot \sqrt{t}$ 0,11	$10^5/t$ $10^5/t$ $10^6/t$ 100
Retinal thermal	$L_R = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	380 – 1400	< 0,25 0,25 – 10	0,0017 $0,011 \cdot \sqrt{(t/10)}$	$50000/(\alpha \cdot t^{0.25})$ $50000/(\alpha \cdot t^{0.25})$
Retinal thermal (weak visual stimulus)	$L_{IR} = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	780 – 1400	> 10	0,011	6000/α

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IEC 62471			
Clause	Requirement + Test	Result - Remark	Verdict

Table 6.1 Emission limits for risk groups of continuous wave lamps									P
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	5.81E-06	0,003	n/a	0,03	n/a
Near UV		E_{UVA}	$W \cdot m^{-2}$	10	9.21E-05	33	n/a	100	n/a
Blue light	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	0.0022	10000	n/a	4000000	n/a
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	1,0*	0E+00	1,0	0E+00	400	n/a
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	$28000/\alpha =$ 1152320.0 7	$6.03E+03$	$28000/\alpha =$ 1944478.0 4	n/a	$71000/\alpha =$ 4930640.7 5	n/a
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	$6000/\alpha =$ 246925.73	n/a	$6000/\alpha =$ 416673.87	n/a	$6000/\alpha =$ 416673.87	n/a
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	6.8208	570	n/a	3200	n/a
* Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian.									
** Involves evaluation of non-GLS source									

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Furthermore remarks:
- Measuring Instrument

Name	Maker	Model No.
Spectrometer	Bentham	IDR300
Telescope	Bentham	TEL309
Cosine response diffuser	Bentham	D7
Quartz fiber bundle	Bentham	FOP-UV-1
Source profiler	Bentham	PSL-Source Profiler
Illuminance meter	Gigahertz-optik	X1

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IEC62471A - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 62471 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES Photobiological safety of lamps and lamps systems	
Differences according to	EN62471:2008
Attachment Form No	EU_GD_IEC62471A
Attachment Originator	IMQ S.p.A.
Master Attachment	2009-07
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CENELEC COMMON MODIFICATIONS (EN)			
4	EXPOSURE LIMITS		
	Contents of the whole Clause 4 of IEC 62471:2006 moved into a new informative Annex ZB		—
	Clause 4 replaced by the following:		
	Limits of the Artificial Optical Radiation Directive (2006/25/EC) have been applied instead of those fixed in IEC 62471:2006	See appended Table 6.1	P
4.1	General		
	First paragraph deleted	Noted	—

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IEC62471A - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

Table 6.1 Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)									P
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	5.81E-06	-	-	-	-
Near UV		E_{UVA}	$W \cdot m^{-2}$	0,33	9.21E-05	-	-	-	-
Blue light	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	0.0022	10000	-	4000000	-
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	0,01*	0E+00	1,0	-	400	-
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	$28000/\alpha = 1152320.07$	6.03E+03	$28000/\alpha$	-	$71000/\alpha$	-
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545000	-				
				$0,0017 \leq \alpha \leq 0,011$					
				$6000/\alpha$	-				
				$0,011 \leq \alpha \leq 0,1$					
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	6.8208	570	-	3200	-

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Clause	Requirement + Test	Result - Remark	Verdict

* Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0.1 radian.
** Involves evaluation of non-GLS source

NOTE The action functions: see Table 4.1 and Table 4.2

The applicable aperture diameters: see 4.2.1

The limitations for the angular subtenses: see 4.2.2

The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5.

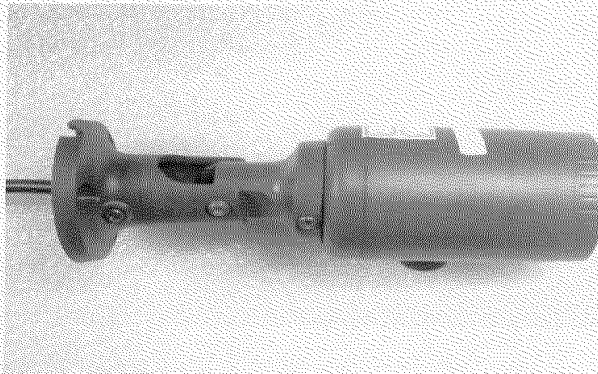
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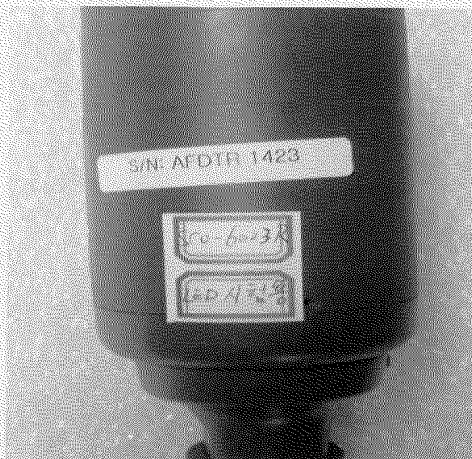
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Photographs

<Fig. 1>



<Fig. 2>

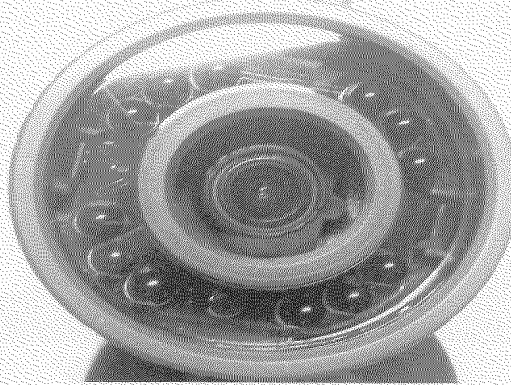


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<Fig. 3>



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Revision Date: 2020-09-27

Test Record No. 1

1. Test result relate only to the items tested.
2. The manufacturer submitted representative production samples of ANALOG CAMERA, Model HCD-6020R, HCD-6010.
3. Only the test listed were considered necessary.

The following tests were conducted:

Tests performed (name of test and test clause):	Testing location:
Input: Single-Phase (1.6.2)	
Stress Relief (4.2.7, 4.2.1)	
Loading - Wall and Ceiling Mounted Equipment (4.2.10)	
Heating (4.5.1, 1.4.12, 1.4.13)	
Component Failure (5.3.1, 5.3.4, 5.3.7)	
The following tests were waived:	Rationale for Waiving
Limited Power Source Measurements (2.5)	Supplied by LPS

Test results are valid only for the tested equipment. These tests are considered representative of the products covered by this Test Report. The test methods and results of the above tests have been reviewed and found to be in accordance with the requirements in the Standard(s) referenced at the beginning of this Test Report.

The following supplements are provided as part of this Test Record. NOTE: These supplements are only available to the Applicant via the myUL™ Client Portal.

Type	Supplement Id	Description
Datasheet	02-01	Datasheet

Revision Date: 2020-09-27

Test Record No. 2

Due to similarity to basic model for this manufacturer, no tests were considered necessary to Change Transparent Cover Enclosure (Plastic) for model HCD-6010

From R/C (QMFZ2), SABIC INNOVATIVE PLASTICS B V (E45329), Model No. HF1130R(f2)

To R/C (QMFZ2), SABIC INNOVATIVE PLASTICS B V (E45329), Model No. 143R(f1)

The following tests were conducted:

Tests performed (name of test and test clause): None	Testing location: None
The following tests were waived: None	Rationale for Waiving

Test results are valid only for the tested equipment. These tests are considered representative of the products covered by this Test Report. The test methods and results of the above tests have been reviewed and found to be in accordance with the requirements in the Standard(s) referenced at the beginning of this Test Report.

The following supplements are provided as part of this Test Record. NOTE: These supplements are only available to the Applicant via the myUL™ Client Portal.

Type	Supplement Id	Description