



Ref. Certif. No.

DE 2-019776

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST
CERTIFICATES FOR ELECTRICAL EQUIPMENT
(IECEE) CB SCHEMESYSTEME CEI D'ACCEPTATION MUTUELLE DE
CERTIFICATS D'ESSAIS DES EQUIPEMENTS
ELECTRIQUES (IECEE) METHODE OCCB TEST CERTIFICATE
CERTIFICAT D'ESSAI OCProduct
Produit

LED Module

Name and address of the applicant
Nom et adresse du demandeurSHENZHEN KING WATT OPTO-ELECTRONICS CO.,LTD.
Bld A1,Zhongtai IT Park No. 2
of Dezheng Road,Shilongzai Block
District, Shenzhen, China
Shiyan Town,Bao'anName and address of the manufacturer
Nom et adresse du fabricantSHENZHEN KING WATT OPTO-ELECTRONICS CO.,LTD.
Bld A1,Zhongtai IT Park No. 2
of Dezheng Road,Shilongzai Block
District, Shenzhen, China
Shiyan Town,Bao'anName and address of the factory
Nom et adresse de l'usineSHENZHEN KING WATT OPTO-ELECTRONICS CO.,LTD.
Bld A1,Zhongtai IT Park No. 2
of Dezheng Road,Shilongzai Block
District, Shenzhen, China
Shiyan Town,Bao'anNote: When more than one factory, please report on page 2
Note: Lorsque il y plus d'une usine, veuillez utiliser la 2^{ème} pageRatings and principal characteristics
Valeurs nominales et caractéristiques principales

1) AC 12V; 50/60Hz; or DC 12V; 2) DC 38V

Trade mark (if any)
Marque de fabrique (si elle existe)

KWT

Model/type Ref.
Ref. de type1) AR0210-AyzeT; AR0212-AyzeT; AR0216-AyzeT;
2) AR0210-ByzeT; AR0212-ByzeT; AR0216-ByzeT;Additional information (if necessary may also be
reported on page 2)
Les Information complémentaire (si nécessaire,
peuvent être indiqués sur la 2^{ème} page)-for the variables of γ , z and e , refer to test report;
-see also test report ref. no. 14717449 001.

PUBLICATION

EDITION

A sample of the product was tested and found
to be in conformity with
Un échantillon de ce produit a été essayé et a été
considéré conforme à laIEC 62031:2008 + A1 + A2
National differences see test reportAs shown in the Test Report Ref. No. which forms part
of this Certificate
Comme indiqué dans le Rapport d'essais numéro de
référence qui constitue une partie de ce Certificat

14717449 001

This CB Test Certificate is issued by the National Certification Body
Ce Certificat d'essai OC est établi par l'Organisme National de CertificationTÜV Rheinland LGA Products GmbH
Tillystraße 2 · 90431 Nürnberg, Germany
Phone + 49 221 806-1371
Fax + 49 221 806-3935
Mail: cert-validity@de.tuv.com
Web: www.tuv.com

Date: 13.01.2016

Signature:

Ing. M. Eichenseder

SHENZHEN KING WATT OPTO-ELECTRONICS
CO.,LTD.

Date : 2016-01-13
Our ref. : awa ZD
Your ref.: 0164046609

Bld A1,Zhongtai IT Park No. 2
of Dezheng Road,Shilongzai Block,
Shiyan Town,Bao'an District, Shenzhen,
China

Ref : CB Certificate Germany

Type of Equipment: LED Module
Model Designation: See Certificate
Certificate No. : DE 2-019776 01
Report No. : 14717449 001

Dear Ladies and Gentlemen,

Thank you very much for your interest in our services.

Please find enclosed your certification documents.

We appreciate your support and would like to offer our assistance in the approval of your future products through our extensive range of technical services. Please feel free to contact us whatever your requirements may be.

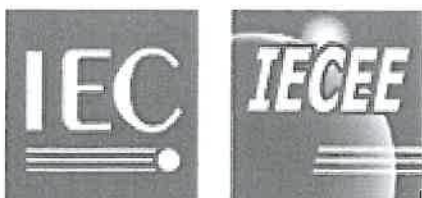
With kind regards,

Certification Body


Ing. M. Eichenseder

Enclosure

证书的详细资料请登陆www.certipedia.com查阅,或拨打我司客服热线800 999 3668 / 400 883 1300咨询



Test Report issued under the responsibility of:



TEST REPORT
IEC 62031
LED modules for general lighting – Safety specifications

Report Number..... : 14717449 001

Date of issue : 2016-01-08

Total number of pages 44 pages

Name of Testing Laboratory preparing the Report TÜV Rheinland / CCIC(Ningbo) Co., Ltd.
3F, Building C13, R&D Park, No.32 Lane 299 Guanghua Road,
National Hi-Tech Zone, Ningbo 315048, P.R. China

Applicant's name : **SHENZHN KING WATT OPTO-ELECTRONICS CO., LTD.**

Address..... : Bld A1, Zhongtai IT Park No.2 of Dezheng Road, Shilongzai
Block, Shiyao Town, Bao'an District, Shenzhen, China

Test specification:

Standard : IEC 62031:2008 (First Edition) + A1:2012 + A2:2014

Test procedure..... : CB Scheme

Non-standard test method..... : N/A

Test Report Form No. : IEC62031C

Test Report Form(s) Originator.... : Intertek Semko AB

Master TRF : 2014-11

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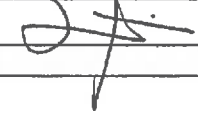
If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

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.

General disclaimer:

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 CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description	LED Module	
Trade Mark	KVT	
Manufacturer	Same as applicant	
Model/Type reference	See model list.	
Ratings	For details, see general product information	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	TÜV Rheinland / CCIC(Ningbo) Co., Ltd.
Testing location/ address	3F, Building C13, R&D Park, No.32 Lane 299 Guanghua Road, National Hi-Tech Zone, Ningbo 315048, P.R. China	
<input type="checkbox"/>	Associated CB Testing Laboratory:	
Testing location/ address		
Tested by (name, function, signature)	Chengchao Huang	
Approved by (name, function, signature) ..	Guoping Zheng	
<input type="checkbox"/>	Testing procedure: TMP/CTF Stage 1:	
Testing location/ address		
Tested by (name, function, signature)		
Approved by (name, function, signature) ..		
<input type="checkbox"/>	Testing procedure: WMT/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: SMT/CTF Stage 3 or 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):

Besides of the tests according to IEC 62031: 2008 +A1 +A2, the following tests are also performed:

1. Thermal test, see annex 5.
2. Photobiological safety of lamps and lamp systems were classified according to standard IEC 62471:2006, IEC TR 62778:2012, EN 62471:2008 and EU directive 2006/25/EC, see annex 6.
3. Photo document.

Summary of testing:
Tests performed (name of test and test clause):

All tests were performed on the model AR0216-AC850T and AR0216-BC850T as representative.

Testing location:

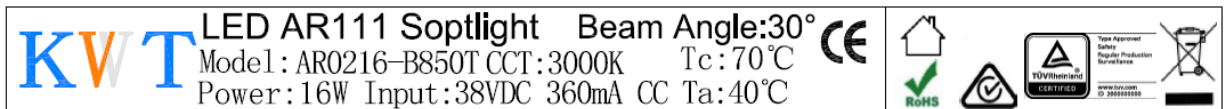
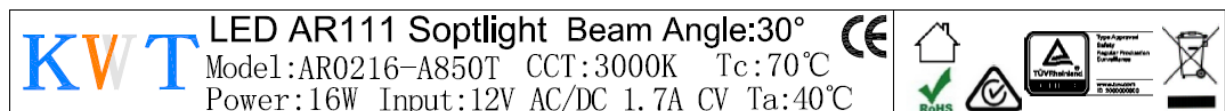
TÜV Rheinland / CCIC(Ningbo) Co., Ltd.
 3F, Building C13, R&D Park, No.32 Lane 299
 Guanghua Road, National Hi-Tech Zone, Ningbo
 315048, P.R. China

Summary of compliance with National Differences:
List of countries addressed
EU= EU GROUP DIFFERENCES

The product fulfils the requirements of EN 62031:2008 +A1:2013 +A2: 2014

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: Other models have the similar marking labels, only model name and rating are different.

Test item particulars: --	
Classification of installation and use: Independent LED module	
Supply Connection: Terminal	
.....: --	
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: 2015-10-08	
Date (s) of performance of tests: 2015-10-08 to 2016-01-08	
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 checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.	
Clause numbers between brackets refer to clauses in IEC 61347-1	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60335-1:	
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) : SHENZHN KING WATT OPTO-ELECTRONICS CO., LTD. Bld A1, Zhongtai IT Park No.2 of Dezheng Road, Shilongzai Block, Shiyan Town, Bao'an District, Shenzhen, China	

General product information:

Product: independent LED module, ta: 40°C, tc: 70°C.

1. All models classified into two series based on the different supply way, dimension.
2. Models of series 1 supplied with integral built in controlgear, which are the same circuit diagram, and PCB layout, connected to supply through separated terminals.
3. Models of series 2 supplied with approved independent SELV LED driver, and connected to supply through connector. All the models are suitable for triac dimming.

Model list:

Series No	Light Model	Input	Rated Power (W)	Dimension (Φ×H) mm
1	AR0210-AyzeT	12V AC, 50/60Hz or 12VDC	10	111×60
	AR0212-AyzeT		12,5	
	AR0216-AyzeT		16	
2	AR0210-ByzeT	38Vdc, 220mA	10	111*×50
	AR0212-ByzeT	38Vdc, 260mA	12,5	
	AR0216-ByzeT	38Vdc, 390mA	16	

Remark:

y=C or L, means LED chip manufacturer, C mean CITIZEN, L means LUMINUS.

z=8 or 9, means color rendering, 8 means color rendering more than 80, 9 means more than 90.

E=27, 30, 35, 40 or 50, means LED chip correlated color temperature, 27 means 2700K, 30 means 3000K, 35 means 3500K, 40 means 4000K, 50 means 5000K.

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
4	GENERAL REQUIREMENTS x		P
4.4	Integral modules tested assembled in the luminaire		N/A
4.5	Independent modules complies with requirements in IEC 60598-1		P
5	GENERAL TEST REQUIREMENTS		P
5.5	SELV-operated LED modules comply with Annex I of IEC 61347-2-13	(see Annex 1)	P
	General conditions for tests in Annex A	(see Annex A)	P
6	CLASSIFICATION		P
	Built-in module	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	Independent module.....	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	Integral module	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	For Integral module; Note to 1.2.1 in IEC 60598-1 applies.		—
7	MARKING		P
7.1	Mandatory markings for built-in or independent modules		P
	a) mark of origin	See marking label	P
	b) model number, type reference	See marking label	P
	c1) constant voltage module; rated supply voltage and supply frequency	See marking label	P
	c2) constant current module; rated supply current and supply frequency		N/A
	d) nominal power	See marking label.	P
	e) indication of connections, wiring diagram		N/A
	f) value of t_c and place on the module	70°C, on the rear center of module	P
	g) E_{thr} if required		N/A
	h) symbol for built-in modules		N/A
	i) heat transfer temperature t_d		N/A
	j) power for heat-conduction P_d		N/A
	k) working voltage for insulation		N/A
7.2	Location of marking		P
	- marking of a), b), c) and f) on the modules		P
	- marking of d), e), g), h), i) and j) on the modules or data sheet		P
	- marking of k) in manufactures literature		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
	- integral modules a) to g) in literature		N/A
7.3	Durable and legibility of marking		P
	- marking of a), b), c) and f) legible after test with water		P
	- marking of d) to j) inspection of compliance		P
8	TERMINALS		P
	Screw terminals according section 14 of IEC 60598-1:		N/A
	Separately approved; component list	(see Annex 2)	N/A
	Part of the luminaire	(see Annex 3)	N/A
	Screwless terminals according section 15 of IEC 60598-1:		P
	Separately approved; component list	(see Annex 2)	N/A
	Part of the luminaire		P
	Connectors according IEC 60838-2-2:		N/A
	Separately approved; component list	(see Annex 2)	N/A
9 (9)	PROVISION FOR PROTECTIVE EARTHING		N/A
- (9.1)	Provisions for protective earthing		N/A
	Terminal complying with clause 8		N/A
	Locked against loosening and not possible to loosen by hand		N/A
	Not possible to loosen clamping means unintentionally on screwless terminals		N/A
	Earthing via means of fixing		N/A
	Earthing terminal only used for the earthing of the control gear		N/A
	All parts of material minimizing the danger of electrolytic corrosion		N/A
	Made of brass or equivalent material		N/A
	Contact surface bare metal		N/A
- (9.2)	Provision for functional earthing		N/A
	Comply with clause 8 and 9.1		N/A
- (9.3)	Earth contact via the track on the printed board		N/A
	Test with a current of 25 A between earthing terminal and each of the accessible metal parts; measured resistance (Ω) at ≥ 10 A according 7.2.3 of IEC 60598-1: $< 0,5 \Omega$		N/A
- (9.4)	Earthing of built-in lamp controlgear		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
	Earth by means of fixing to earthed metal of luminaire in compliance of 7.2 of IEC 60598-1		N/A
	Earthing terminal only for earthing the built-in controlgear		N/A
- (9.5)	Earthing via independent controlgear		N/A
- (9.5.1)	Earth connection to other equipment		N/A
	Looping or through connection, conductor min. 1,5 mm ² and of copper or equivalent		N/A
	Protective earthing wires in line with 5.3.1.1 and clause 7		N/A
- (9.5.2)	Earthing of the lamp compartments powered via the independent lamp controlgear		N/A
	Test with a current of 25 A between input and output earth terminals; measured resistance (Ω) between earthing terminal and each of the accessible metal parts at ≥ 10 A according 7.2.3 of IEC 60598-1: < 0,5 Ω		N/A
	Output earthing terminal marked as in 7.1 t) of IEC 61347-1		N/A
10 (10)	PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS		N/A
- (10.1)	Controlgear protected against accidental contact with live parts		N/A
- (A2)	The current flowing between the part concerned and earth is measured and does not exceed 0,7 mA (peak) or 2 mA d.c.		N/A
- (A2)	For frequencies above 1 kHz, the current does not exceed 0,7 mA (peak) multiplied by the value of the frequency in kilohertz or 70 mA (peak)		N/A
- (A3)	The voltage between the part concerned and any accessible part is measured and does not exceed 34 V (peak).....		N/A
- (10.1)	Lacquer or enamel not used for protection or insulation		N/A
	Adequate mechanical strength on parts providing protection		N/A
- (10.2)	Capacitors > 0,5 μ F: voltage after 1 min (V): < 50 V		N/A
- (10.3)	Controlgear providing SELV		N/A
	Accessible conductive parts are insulated from live parts by double or reinforced insulation in SELV controlgear		
	No connection between output circuit and the body or protective earthing circuit		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
	No possibility of connection between output circuit and the body or protective earthing circuit through other conductive parts		N/A
	SELV outputs separated by at least basic insulation		N/A
	ELV conductive parts insulated as live parts		N/A
	Tests according Annex L of IEC 61347-1		N/A
- (10.4)	Accessible conductive parts in SELV circuits		N/A
	Output voltage under load ≤ 25 V r.m.s. or ≤ 60 V d.c.		N/A
	If output voltage > 25 V r.m.s. or > 60 V d.c.; No load output ≤ 35 V peak or ≤ 60 V d.c and touch current does not exceed 0,7 mA (peak) or 2 mA d.c. :		N/A
	One conductive part is insulated if output voltage or current exceeding the values above and withstand test voltage 500 V		N/A
	Double or reinforced insulation bridged by appropriate and at least two resistors or two Y2 capacitors or one Y1 capacitor		N/A
	Y1 or Y2 capacitors comply with IEC 60384-14		N/A
	Resistors comply with test (a) in 14.1 of IEC 60065		N/A

11 (11)	MOISTURE RESISTANCE AND INSULATION		P
	After storage 48 h at 91-95% relative humidity and 20-30 °C measuring of insulation resistance with d.c. 500 V (M Ω):		P
	For basic insulation ≥ 2 M Ω	500 M Ω	P
	For double or reinforced insulation ≥ 4 M Ω		N/A
	Between primary and secondary circuits in controlgear providing SELV, values in Annex L in IEC 61347-1		N/A

12 (12)	ELECTRIC STRENGTH		P
	Immediately after clause 11 electric strength test for 1 min		P
	Basic insulation for SELV, test voltage 500 V		N/A
	Working voltage ≤ 50 V, test voltage 500 V	Input to accessible parts	P
	Working voltage > 50 V ≤ 1000 V, test voltage (V):		N/A
	Basic insulation, 2U + 1000 V		N/A
	Supplementary insulation, 2U + 1000 V		N/A
	Double or reinforced insulation, 4U + 2000 V		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
	No flashover or breakdown		P
	Solid or thin sheet insulation for double or reinforced insulation fulfil the requirements in Annex N in IEC 61347-1		N/A
13 (14)	FAULT CONDITIONS		P
- (14)	When operated under fault conditions the controlgear:		P
	- does not emit flames or molten material		P
	- does not produce flammable gases		P
	- protection against accidental contact not impaired		P
	Thermally protected controlgear does not exceed the marked temperature value		N/A
	Fault conditions: capacitors, resistors or inductors without proof of compliance with relevant specifications have been short-circuited or disconnected	(see appended table)	P
- (14.1)	Short-circuit of creepage distances and clearances if less than specified in clause 16 in Part 1 (except between live parts and accessible metal parts)	(see appended table)	N/A
	Creepage distances on printed boards less than specified in clause 16 in Part 1 provided with coating according to IEC 60664-3		N/A
- (14.2)	Short-circuit or interruption of semiconductor devices	(see appended table)	P
- (14.3)	Short-circuit across insulation consisting of lacquer, enamel or textile	(see appended table)	P
- (14.4)	Short-circuit across electrolytic capacitors	(see appended table)	P
- (14.5)	After the tests has been carried out on three samples:		P
	The insulation resistance $\geq 1 \text{ M}\Omega$	500 M Ω	P
	No flammable gases		P
	No accessible parts have become live		P
	During the tests, a five-layer tissue paper, where the test specimen is wrapped, does not ignite		P
- (14.6)	Relevant fault condition tests with high-power supply		N/A
13.2	Overpower condition		P
	Module withstands overpower condition >15 min.		P
	Module with automatic protective device or power limiter, test performed 15 min. at limit.		N/A
	No fire, smoke or flammable gas is produced		P
	Molten material does not ignite tissue paper, spread below the module		P

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
15	CONSTRUCTION		P
	Wood, cotton, silk, paper and similar fibrous material not used as insulation		P
16 (16)	CREEPAGE DISTANCES AND CLEARANCES		P
- (16)	Creepage and distances and clearances in compliance with IEC 61347-1	(see appended table)	P
	Insulating lining of metallic enclosures		N/A
	Basic insulation on printed boards tested according to clause 14		P
	Distances subjected to both sinusoidal voltage as non-sinusoidal pulses not less than value in Table 16		N/A
	Creepage distances not less than minimum clearance		P
16 (-)	Conductive accessible parts in compliance with applicable parts of IEC 60598-1		P
17 (17)	SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS		P
	Cl. 17 refer to Cl. 17 of IEC 61347-1 which refer to Cl. 4.11 and 4.12 of IEC 60598-1 (clause numbers between parentheses refer to IEC 60598-1)		—
(4.11)	Electrical connections		P
(4.11.1)	Contact pressure		P
(4.11.2)	Screws:		N/A
	- self-tapping screws		N/A
	- thread-cutting screws		N/A
(4.11.3)	Screw locking:		N/A
	- spring washer		N/A
	- rivets		N/A
(4.11.4)	Material of current-carrying parts		P
(4.11.5)	No contact to wood or mounting surface		P
(4.11.6)	Electro-mechanical contact systems	Connector	P
(4.12)	Mechanical connections and glands		N/A
(4.12.1)	Screws not made of soft metal		N/A
	Screws of insulating material		N/A
	Torque test: torque (Nm); part.....:		N/A
	Torque test: torque (Nm); part.....:		N/A
	Torque test: torque (Nm); part.....:		N/A
(4.12.2)	Screws with diameter < 3 mm screwed into metal		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
(4.12.4)	Locked connections:		N/A
	- fixed arms; torque (Nm)		N/A
	- lampholder; torque (Nm)		N/A
	- push-button switches; torque 0,8 Nm		N/A
(4.12.5)	Screwed glands; force (Nm).....		N/A
18 (18)	RESISTANCE TO HEAT, FIRE AND TRACKING		P
- (18.1)	Ball-pressure test	See Test Table 18 (18.1)	P
- (18.3)	Glow-wire test (650°C)	See Test Table 18 (18.3)	P
- (18.4)	Needle-flame test (10 s)		N/A
- (18.5)	Proof tracking test		N/A
19 (19)	RESISTANCE TO CORROSION		N/A
	- test according 4.18.1 of IEC 60598-1		N/A
	- adequate varnish on the outer surface		N/A
20	INFORMATION FOR LUMINAIRE DESIGN		N/A
	Information in Annex D (informative)		—
21	HEAT MANAGEMENT		N/A
21.1	General		N/A
	Exchangeability is safeguarded by cap or base		N/A
21.2	Heat-conducting foil and paste		N/A
	Heat-conducting foil delivered with the module if necessary		N/A
22	PHOTOBIOLOGICAL SAFETY		P
22.1	UV radiation		N/A
	Luminous radiation not exceed 2mW/klm		N/A
22.2	Blue light hazard		P
	Assessed according to IEC TR 62778		P
22.3	Infrared radiation		N/A
	Requirements for infrared radiation when required		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
A	ANNEX A - TESTS		P
	All tests performed in accordance with the advice given in Annex H of IEC 61347-1, if applicable		P

13 (14)	TABLE: tests of fault conditions	P
Part	Simulated fault	Hazard
AR0216-AC850T		
D4	Short circuit: AC12V Test result: unit worked as normal.	NO
R7	Short circuit: AC12V Test result: unit worked as normal.	NO
L3	Short circuit: AC12V Test result: unit worked as normal.	NO
U1 pin(1-7)	Short circuit: AC12V Test result: unit shut down.	NO
D1	Short circuit: AC12V Test result: unit shut down.	NO
C10	Short circuit: AC12V Test result: unit shut down.	NO
output	Short circuit: AC12V Test result: unit shut down.	NO

IEC 62031							
Clause	Requirement + Test	Result - Remark					Verdict
16 (16)	TABLES: Creepage distances and clearances						P
Table 3	Minimum distances (mm) for a.c. (50/60 Hz) sinusoidal voltages						P
RMS working voltage (V) not exceeding	50	150	250	500	750	1000	
Creepage distances							
Required basic insulation, PTI \geq 600	0,6	0,8	1,5	3	4	5,5	
Measured	--	--	--	--	--	--	
Measured	--	--	--	--	--	--	
Measured	--	--	--	--	--	--	
Required basic insulation, PTI < 600	1,2	1,6	2,5	5	8	10	
Measured (Live parts to accessible part)	1,5	--	--	--	--	--	
Required supplementary insulation PTI \geq 600	-	0,8	1,5	3	4	5,5	
Measured	--	--	--	--	--	--	
Required supplementary insulation PTI < 600	-	1,6	2,5	5	8	10	
Measured	--	--	--	--	--	--	
Required reinforced insulation	-	3,2	5	6	8	11	
Measured	--	--	--	--	--	--	
Clearances							
Required basic insulation	0,2	0,8	1,5	3	4	5,5	
Measured (Live parts to accessible part)	1,5	--	--	--	--	--	
Measured	--	--	--	--	--	--	
Required supplementary insulation	-	0,8	1,5	3	4	5,5	
Measured	--	--	--	--	--	--	
Required reinforced insulation	-	1,6	3	6	8	11	
Measured	--	--	--	--	--	--	
Table 4	Minimum distances (mm) for non-sinusoidal pulse voltages						N/A
Rated pulse voltage (peak kV)	2,0	2,5	3,0	4,0	5,0	6,0	8,0
Required clearances	1,0	1,5	2	3	4	5,5	8
Measured							
Rated pulse voltage (peak kV)	10	12	15	20	25	30	40
Required clearances	11	14	18	25	33	40	60
Measured							
Rated pulse voltage (peak kV)	50	60	80	100	-	-	-
Required clearances	75	90	130	170	-	-	-
Measured							

IEC 62031					
Clause	Requirement + Test			Result - Remark	Verdict
18 (18.1)	TABLE: Ball Pressure Test of Thermoplastics				P
Allowed impression diameter (mm)				2 mm	—
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)		
LED module PCB	SHENZHEN KAI ZHUO	125	0,7		
Supplementary information: N/A					

18 (18.3)	TABLE: Glow-wire test				P
Glow wire temperature				650°C	—
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict
DC connector for AR02xx-ByzeT	ZHEJIANG JINDA ELECTRONICS CO LTD	30	No	0	P
LED module PCB	SHENZHEN KAI ZHUO	30	No	0	P
LED module cover	SHENZHEN SIDUO OPTICAL ELECTRONIC CO., LTD	30	No	0	P
LED module enclosure	CHANG CHUN PLASTICS	30	No	0	P
Any flame or glowing of the sample extinguished within 30 s of withdrawing the glow-wire, and any burning or molten drop did not ignite the underlying parts (Yes/No)					No
Supplementary information: N/A					

18 (18.4)	TABLE: Needle-flame test				N/A
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict
--	--	--	--	--	-
Supplementary information: N/A					

18 (18.5)	TABLE: Proof tracking test				N/A
Test voltage PTI				600 V	—
Object/ Part No./ Material	Manufacturer/ trademark	Withstand 50 drops without failure on three places or on three specimens			Verdict
--	--	--	--	--	-
Supplementary information:					

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
ANNEX 1	SELV-operated LED modules		N/A
	Cl. 5.5 refer to ANNEX I of IEC 61347-2-13 which refer to ANNEX L of IEC 61347-1 (clause numbers between parentheses refer to ANNEX L of IEC 61347-1)		—
(L.3)	Classification		N/A
	Class I	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	Class II	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	Class III	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	non-inherently short circuit proof controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	inherently short circuit proof controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	fail safe controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	non-short-circuit proof controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
(L.4)	Marking		N/A
	Adequate symbols are used		N/A
(L.5)	Protection against electric shock		N/A
	Comply with 9.2 of IEC 61558-1		N/A
(L.6)	Heating		N/A
	No excessive temperatures in normal use		N/A
	Value if capacitor tc marked		—
	Winding insulation classified as Class		—
	Comply with tests of clause 14 of IEC 61558-1 with adjustments		N/A
(L.7)	Short-circuit and overload protection		N/A
	Comply with tests of clause 15 of IEC 61558-1 with adjustments		N/A
(L.8)	Insulation resistance and electric strength		N/A
(L.8.1)	Conditioned 48 h between 91 % and 95 %		N/A
(L.8.2)	Insulation resistance		N/A
	Between input- and output circuits not less than 5 MΩ		N/A
	Between metal parts of class II convertors which are separated from live parts by basic insulation only and the body not less than 5 MΩ		N/A
	Between metal foil in contact with the inner and outer surfaces of enclosures of insulating material not less than 2 MΩ		N/A
(L.8.3)	Electric strength		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
	1) Between live parts of input circuits and live parts of output circuits		N/A
	2) Over basic or supplementary insulation between:		N/A
	a) live parts having different polarity		N/A
	b) live parts and body if intended to be connected to protective earth		N/A
	c) accessible metal parts and a metal rod of the same diameter as the flexible cable or cord		N/A
	d) live parts and an intermediate metal part		N/A
	e) intermediate metal parts and the body		N/A
	f) each input circuit and all other input circuits		N/A
	3) Over reinforced insulation between the body and live parts		N/A
(L.9)	Construction		N/A
(L.9.1)	Transformer comply with 19.12 of IEC 61558-1 and 19 of IEC 61558-2-6		N/A
	HF transformer comply with 19 of IEC 61558-2-16		N/A
(L.10)	Components		N/A
	Protective devices comply with 20.6 – 20.11 of IEC 61558-1		N/A
(L.11)	Creepage distances and clearances		N/A
	1. Insulation between input and output circuits, basic insulation:		N/A
	a) measured values \geq specified values (mm)		N/A
	b) measured values \geq specified values (mm)		N/A
	c) measured values \geq specified values (mm)		N/A
	2. Insulation between input and output circuits, double or reinforced insulation:		N/A
	a) measured values \geq specified values (mm)		N/A
	b) measured values \geq specified values (mm)		N/A
	c) measured values \geq specified values (mm)		N/A
	3. Insulation between adjacent <u>output</u> circuits		N/A
	- measured values \geq specified values (mm)		N/A
	4. Insulation between terminals for external connection:		N/A
	- measured values \geq specified values (mm)		N/A
	5. Basic or supplementary insulation:		N/A
	a) measured values \geq specified values (mm)		N/A
	b) measured values \geq specified values (mm)		N/A
	c) measured values \geq specified values (mm)		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
	d) measured values \geq specified values (mm)		N/A
	e) measured values \geq specified values (mm)		N/A
	6. Reinforced insulation or insulation:		N/A
	Between body and output circuit: measured values \geq specified values (mm)		N/A
	Between body and output circuit if provision against transient voltages: measured values \geq specified values (mm)		N/A
	7. Distance through insulation:		N/A
	a) measured values \geq specified values (mm)		N/A
	b) measured values \geq specified values (mm)		N/A
	c) measured values \geq specified values (mm)		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX 2 TABLE: Critical components information						--
Object / part No.	Code	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾
Driver for AR0210-ByzeT	B	Shenzhen King Watt Opto-Electronics Co., Ltd	KWT Driver 15W 200-300mA Trcc SR	Input: 220-240VAC, 15W; output: 27-38VDC, U-out:42VDC, Constant current 220mA; ta :50°C, tc:90°C	IEC/EN 61347-1; IEC/EN 61347-2-13	TUV R 50324311
Driver for AR0212-ByzeT	B	Shenzhen King Watt Opto-Electronics Co., Ltd	KWT Driver 15W 200-300mA Trcc SR	Input: 220-240VAC, 15W; output: 27-38VDC, U-out:42VDC, Constant current 280mA; ta:50°C, tc:90°C	IEC/EN 61347-1; IEC/EN 61347-2-13	TUV R 50324311
Driver for AR0216-ByzeT	B	Shenzhen King Watt Opto-Electronics Co., Ltd	KWT Driver 21W 300-450mA Trcc SR	Input: 220-240VAC, 21W; output: 27-38VDC, U-out:42VDC, Constant current 390mA; ta:50°C, tc:90°C	IEC/EN 61347-1; IEC/EN 61347-2-13	TUV R 50324311
LED module connection wire for AR02xx-AyzeT	C	DONG GUAN SHENG PAI ELECTRIC WIRE & CABLE CO LTD	3122	32 -16 AWG	IEC/EN 62031	UL E347603 + tested with appliance
LED module connection wire for AR02xx-ByzeT	C	SHEN ZHEN CITY HUIXINHUI ELECTRONIC S CO LTD	1007	32 -16 AWG	IEC/EN 62031	UL E342431 + tested with appliance
Heat-shrinkable tube for AR02xx-ByzeT	C	SHENZHEN WOER	RSFR-H	600V; 125°C	IEC/EN 62031	UL E203950 + tested with appliance
Input cord for AR02xx-ByzeT	B	Top Resources	H03VVH2-F	2x0,75mm ²	DIN VDE 0281-5	VDE 096273
Alternative	D	Zhongshan Luoka	H03VVH2-F	2x0,75mm ²	IEC/EN 60227	VDE 40034861
Alternative	D	Guangdong KaiHua Electric Appliance Co., Ltd,	H03VVH2-F	2x0,75mm ²	--	VDE 40001903

IEC 62031						
Clause	Requirement + Test			Result - Remark	Verdict	
Alternative	D	Guangdong KaiHua Electric Appliance Co., Ltd,	H03VVH2-F	2x0,75mm ²	AS/NZS 3191	NSW18304
Tube which enclose input wire of LED module for AR02xx-ByzeT	B,C	SHENZHEN JDD TECH CO LTD	JDD-FR+	125°C	IEC/EN 62031	UL E316646
LED chip	C	CITIZEN ELECTRONICS CO., LTD	CLL, CLU	33-38VDC, 1,8Amax; CCT:2700-5000K, Ra>80; White	IEC/EN 62031	Test with appliance
LED chip	C	Luminus Devices, Inc	CHM	33-38VDC, 1,2Amax; CCT:2700-5000K, Ra>80; White	IEC/EN 62031	Test with appliance
LED lens	C	TEIJIN CHEMICALS LTD	LN-2250	V-0; 115°C	IEC/EN 62031	UL E50075+ tested with appliance
LED cover	C	SHENZHEN SIDUO OPTICAL ELECTRONIC CO., LTD	--	PMMA	IEC/EN 62031	Tested with appliance
PCB	B,C	SHENZHEN KAI ZHUO	KZ-1	V-0; 130°C	IEC/EN 62031	UL E337072 + tested with appliance
Potting material	C	Shenzhen Bornsun Industrial Co., Ltd.	BN-RT100	V-0	IEC/EN 62031	UL E256822 + tested with appliance
Enclosure	B,C	CHANG CHUN PLASTICS	6700	PET; V-0; 120°C	IEC/EN 62031	UL E59481 + tested with appliance
DC connector for AR02xx-ByzeT	C	ZHEJIANG JINDA ELECTRONIC S CO LTD	BH-2Y	PBT; 45VDC; 1A	IEC/EN 62031	Tested with appliance
<p>Supplementary information:</p> <p>¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039.</p> <p>The codes above have the following meaning:</p> <p>A - The component is replaceable with another one, also certified, with equivalent characteristics</p> <p>B - The component is replaceable if authorised by the test house</p> <p>C - Integrated component tested together with the appliance</p> <p>D - Alternative component</p>						

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
ANNEX 3	Screw terminals (part of the luminaire)		N/A
(14)	SCREW TERMINALS		N/A
(14.2)	Type of terminal..... :		—
	Rated current (A)..... :		—
(14.3.2.1)	One or more conductors		N/A
(14.3.2.2)	Special preparation		N/A
(14.3.2.3)	Terminal size		N/A
	Cross-sectional area (mm ²)..... :		—
(14.3.3)	Conductor space (mm)..... :		N/A
(14.4)	Mechanical tests		N/A
(14.4.1)	Minimum distance		N/A
(14.4.2)	Cannot slip out		N/A
(14.4.3)	Special preparation		N/A
(14.4.4)	Nominal diameter of thread (metric ISO thread) :	M	N/A
	External wiring		N/A
	No soft metal		N/A
(14.4.5)	Corrosion		N/A
(14.4.6)	Nominal diameter of thread (mm) :		N/A
	Torque (Nm) :		N/A
(14.4.7)	Between metal surfaces		N/A
	Lug terminal		N/A
	Mantle terminal		N/A
	Pull test; pull (N) :		N/A
(14.4.8)	Without undue damage		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
ANNEX 4	Screwless terminals (part of the luminaire)		N/A
(15)	SCREWLESS TERMINALS		N/A
(15.2)	Type of terminal..... :		—
	Rated current (A)..... :		—
(15.3.1)	Material		N/A
(15.3.2)	Clamping		N/A
(15.3.3)	Stop		N/A
(15.3.4)	Unprepared conductors		N/A
(15.3.5)	Pressure on insulating material		N/A
(15.3.6)	Clear connection method		N/A
(15.3.7)	Clamping independently		N/A
(15.3.8)	Fixed in position		N/A
(15.3.10)	Conductor size		N/A
	Type of conductor		N/A
(15.5.1)	Terminals internal wiring		N/A
(15.5.1.1)	Pull test spring-type terminals (4 N, 4 samples) :		N/A
(15.5.1.2)	Pull test pin or tab terminals (4 N, 4 samples) :		N/A
	Insertion force not exceeding 50 N		N/A
(15.5.1.2)	Permanent connections: pull-off test (20 N)		N/A
(15.5.2)	Electrical tests		P
	Voltage drop (mV) after 1 h (4 samples)..... :		N/A
	Voltage drop of two inseparable joints		N/A
	Number of cycles:		—
	Voltage drop (mV) after 10th alt. 25th cycle (4 samples)..... :		N/A
	Voltage drop (mV) after 50th alt. 100th cycle (4 samples)..... :		N/A
	After ageing, voltage drop (mV) after 10th alt. 25th cycle (4 samples) :		N/A
	After ageing, voltage drop (mV) after 50th alt. 100th cycle (4 samples) :		N/A
(15.6)	Terminals external wiring		N/A
	Terminal size and rating		N/A
(15.6.2.1)	Pull test spring-type terminals or welded connections (4 samples); pull (N) :		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict

	Pull test pin or tab terminals (4 samples); pull (N)		N/A
--	---	--	-----

(15.6.3.1)	TABLE: Contact resistance test										N/A
	Voltage drop (mV) after 1 h										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											N/A
	Voltage drop of two inseparable joints										N/A
	Voltage drop after 10th alt. 25th cycle										N/A
	Max. allowed voltage drop (mV)										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											N/A
	Voltage drop after 50th alt. 100th cycle										N/A
	Max. allowed voltage drop (mV)										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											N/A
	Continued ageing: voltage drop after 10th alt. 25th cycle										N/A
	Max. allowed voltage drop (mV)										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											N/A
	Continued ageing: voltage drop after 50th alt. 100th cycle										N/A
	Max. allowed voltage drop (mV)										—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
Supplementary information:											

Annex 5-1	Thermal test		P
	Type reference	AR0216-AC850T	—
	Test condition	Normal operation	—
	test voltage	12 V	—
	Supply wattage (W)	17,0 W	—
	Supply current (A)	1,42 A	—
	Mounting position	According instruction	—
	Frequency (Hz)	50 Hz	—
	Table: measured temperatures corrected for ta = 40°C:		—
temperature (°C/K) of part		Test value	Result
			limit
LED module enclosure		64,3°C	-- Ref.
tc		66,5°C	-- 70°C
Terminals		67,7°C	-- 90°C
PCB		76,7°C	-- 130°C
Internal wire		81,4°C	-- 90°C
LED module cover		77,6°C	-- Ref.
Mounting surface		57,9°C	-- 90°C
Lighted object(10cm)		45,9°C	-- 90°C
Fault condition: R7 short-circuited			
temperature (°C/K) of part		Test value	Result
			limit
LED module enclosure		67,1°C	-- 90°C
tc		69,5°C	-- Ref.
Terminals		70,4°C	-- Ref.
PCB		79,4°C	-- 130°C
Internal wire		84,0°C	-- 90°C
LED module cover		79,9°C	-- Ref.
Mounting surface		60,7°C	-- 130°C
Lighted object(10cm)		48,7°C	-- 130°C

Annex 5-2	Thermal test		P
	Type reference	AR0216-BC850T	—
	Test condition	Normal operation	—
	test voltage	254,4 V	—
	Supply wattage (W)	15,9 W	—
	Supply current (A)	0,066 A	—
	Mounting position	According instruction	—
	Frequency (Hz)	50 Hz	—
	Table: measured temperatures corrected for ta = 40°C:		—
temperature (°C/K) of part	Test value	Result	
			limit
LED driver power cable	42,4°C	--	90°C
Tc of LED driver	45,1°C	--	70°C
LED driver output cable	43,4°C	--	90°C
LED driver output connector	41,7°C	--	90°C
LED module enclosure	53,6°C	--	Ref.
Tc of LED module	44,9°C	--	Ref.
Internal wire	72,4°C	--	90°C
LED module cover	69,4°C	--	Ref.
Mounting surface	44,9°C	--	90°C
Lighted object(10cm)	45,2°C	--	90°C

ANNEX 6	Photobiological safety of lamps and lamp systems were classified according to standard IEC 62471:2006, IEC TR 62778:2012, EN 62471:2008 and EU directive 2006/25/EC.		
Clause	Requirement + Test	Result – Remark	Verdict
4	EXPOSURE LIMITS		P
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 $10^4 \text{ cd}\cdot\text{m}^{-2}$	see clause 4.3	N/A
4.3	Hazard exposure limits		P
4.3.1	Actinic UV hazard exposure limit for the skin and eye	(See appended test data)	N/A
	The exposure limit for effective radiant exposure is $30 \text{ J}\cdot\text{m}^{-2}$ within any 8-hour period	(See appended test data)	N/A
	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:		N/A
	$E_s \cdot t = \sum_{200}^{400} \sum_t E_\lambda(\lambda, t) \cdot S_{UV}(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 30 \quad \text{J}\cdot\text{m}^{-2}$		N/A
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		N/A
	$t_{\max} = \frac{30}{E_s} \quad \text{s}$		N/A
4.3.2	Near-UV hazard exposure limit for eye		N/A
	For the spectral region 315 nm to 400 nm (UV-A) the total radiant exposure to the eye shall not exceed $10000 \text{ J}\cdot\text{m}^{-2}$ 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 $10 \text{ W}\cdot\text{m}^{-2}$.		N/A
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s, shall be computed by:		N/A
	$t_{\max} \leq \frac{10\,000}{E_{UVA}} \quad \text{s}$		N/A
4.3.3	Retinal blue light hazard exposure limit		P

ANNEX 6 Photobiological safety of lamps and lamp systems were classified according to standard IEC 62471:2006, IEC TR 62778:2012, EN 62471:2008 and EU directive 2006/25/EC.			
Clause	Requirement + Test	Result – Remark	Verdict
	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
	$L_B \cdot t = \sum_{300}^{700} \sum_t L_\lambda(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 10^6 \quad \text{J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	for $t \leq 10^4$ s $t_{\max} = \frac{10^6}{L_B}$	N/A
	$L_B = \sum_{300}^{700} L_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \quad \text{W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	for $t > 10^4$ s	P
4.3.4	Retinal blue light hazard exposure limit - small source		N/A
	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	N/A
	$E_B \cdot t = \sum_{300}^{700} \sum_t E_\lambda(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \quad \text{J} \cdot \text{m}^{-2}$	for $t \leq 100$ s	N/A
	$E_B = \sum_{300}^{700} E_\lambda \cdot B(\lambda) \cdot \Delta\lambda \leq 1 \quad \text{W} \cdot \text{m}^{-2}$	for $t > 100$ s	N/A
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:		P
	$I_R = \sum_{380}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{50\,000}{\alpha \cdot t^{0,25}} \quad \text{W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	($10 \mu\text{s} \leq t \leq 10$ 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:	(See appended test data)	N/A
	$L_{IR} = \sum_{780}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{6\,000}{\alpha} \quad \text{W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	$t > 10$ s	N/A
4.3.7	Infrared radiation hazard exposure limits for the eye		N/A

ANNEX 6 Photobiological safety of lamps and lamp systems were classified according to standard IEC 62471:2006, IEC TR 62778:2012, EN 62471:2008 and EU directive 2006/25/EC.			
Clause	Requirement + Test	Result – Remark	Verdict
	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:		N/A
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 18\,000 \cdot t^{-0,75} \quad W \cdot m^{-2}$	$t \leq 1000 \text{ s}$	N/A
	For times greater than 1000 s the limit becomes:		N/A
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 100 \quad W \cdot m^{-2}$	$t > 1000 \text{ s}$	N/A
4.3.8	Thermal hazard exposure limit for the skin		P
	Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:		P
	$E_{H \cdot t} = \sum_{380}^{3000} \sum_t E_{\lambda}(\lambda, t) \cdot \Delta t \cdot \Delta\lambda \leq 20\,000 \cdot t^{0,25} \quad J \cdot m^{-2}$		P
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)	Sample was stable after being operated with 1 hour.	P
	Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.		P
5.1.2	Test environment	(See appended test data)	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.		P
5.1.3	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	LED module	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

ANNEX 6 Photobiological safety of lamps and lamp systems were classified according to standard IEC 62471:2006, IEC TR 62778:2012, EN 62471:2008 and EU directive 2006/25/EC.			
Clause	Requirement + Test	Result – Remark	Verdict
5.1.5	Lamp system operation		P
	The power source for operation of the test lamp shall be provided in accordance with:		P
	– 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
	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	(See appended test data)	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	CW	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

ANNEX 6	Photobiological safety of lamps and lamp systems were classified according to standard IEC 62471:2006, IEC TR 62778:2012, EN 62471:2008 and EU directive 2006/25/EC.		
Clause	Requirement + Test	Result – Remark	Verdict
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		P
	The quality of all measurement results must be quantified by an analysis of the uncertainty.	see Annex C	P
6	LAMP CLASSIFICATION		P
	For the purposes of this standard it was decided that the values shall be reported as follows:	see table 6.1	P
	– 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	4,92m 4,9m	P
	– for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm		N/A
6.1	Continuous wave lamps		P
6.1.1	Except Group		N/A
	In the except group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not pose:		N/A
	– an actinic ultraviolet hazard (E_S) within 8-hours exposure (30000 s), nor		N/A
	– a near-UV hazard (E_{UVA}) within 1000 s, (about 16 min), nor		N/A
	– a retinal blue-light hazard (L_B) within 10000 s (about 2,8 h), 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 1000 s		N/A
6.1.2	Risk Group 1 (Low-Risk)		P
	In this group are lamps, which exceeds the limits for the except group but that does not pose:		P
	– 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		P

ANNEX 6 Photobiological safety of lamps and lamp systems were classified according to standard IEC 62471:2006, IEC TR 62778:2012, EN 62471:2008 and EU directive 2006/25/EC.			
Clause	Requirement + Test	Result – Remark	Verdict
	– a retinal thermal hazard (L_R) within 10 s, nor		P
	– 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 (aversion response), nor		N/A
	– 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 does is below the EL shall be classified as belonging to the Exempt Group		N/A

ANNEX 6	Photobiological safety of lamps and lamp systems were classified according to standard IEC 62471:2006, IEC TR 62778:2012, EN 62471:2008 and EU directive 2006/25/EC.		
Clause	Requirement + Test	Result – Remark	Verdict
	– 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

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

Table 4.1	Spectral weighting function for assessing ultraviolet hazards for skin and eye			N/A
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.

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

Table 4.2	Spectral weighting functions for assessing retinal hazards from broadband optical sources		P
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		$10^{[(700-\lambda)/500]}$	
1050-1150		0,2	
1150-1200		$0,2 \cdot 10^{0,02(1150-\lambda)}$	
1200-1400		0,02	

Table 5.4	Summary of the ELs for the surface of the skin or cornea (irradiance based values)					P
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 $0,0011 \cdot \sqrt{t}$ 0,1	$10^6/t$ $10^6/t$ $10^6/t$ 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	$6000/\alpha$	

Table 6.1		Emission limits for risk groups of continuous wave lamps AR0216-AC850T with CITIZEN LED chip							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	--	0,003	--	0,03	--	
Near UV		E_{UVA}	$W \cdot m^{-2}$	10	--	33	--	100	--	
Blue light	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	--	10000	3,477E+03	4000000	--	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	1,0*	--	1,0	--	400	--	
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	$28000/\alpha^{***}$	--	$28000/\alpha$	$8,347E+04$	$71000/\alpha$	--	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	$6000/\alpha^{***}$	--	$6000/\alpha$	--	$6000/\alpha$	--	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	--	570	--	3200	--	
* 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 *** $\alpha = 16,22$ mrad										

Table 6.1		Emission limits for risk groups of continuous wave lamps AR0216-AC850T with LUMINUS LED chip							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	--	0,003	--	0,03	--	
Near UV		E_{UVA}	$W \cdot m^{-2}$	10	--	33	--	100	--	
Blue light	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	--	10000	3,607E+03	4000000	--	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	1,0*	--	1,0	--	400	--	
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	$28000/\alpha^{***}$	--	$28000/\alpha$	$8,643E+04$	$71000/\alpha$	--	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	$6000/\alpha^{***}$	--	$6000/\alpha$	--	$6000/\alpha$	--	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	--	570	--	3200	--	
* 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 *** $\alpha = 15,81$ mrad										

ATTACHMENT TO TEST REPORT IEC 62471 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES Photobiological safety of lamps and lamps systems	
Differences according to.....:	EN 62471:2008
Attachment Form No.....:	EU_GD_IEC62471A
Attachment Originator	IMQ S.p.A.
Master Attachment	2009-07
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	CENELEC COMMON MODIFICATIONS (EN)	P
4	EXPOSURE LIMITS	P
	Contents of the whole Clause 4 of IEC 62471:2006 moved into a new informative Annex ZB	—
	Clause 4 replaced by the following:	P
	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	P
	First paragraph deleted	—

Table 6.1		Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC) AR0216-AC850T with CITIZEN LED chip							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	--	--	--	--	--	
Near UV		E_{UVA}	$W \cdot m^{-2}$	0,33	--	--	--	--	--	
Blue light	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	--	10000	3,510E+03	4000000	--	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	0,01*	--	1,0	--	400	--	
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	$28000/\alpha^{***}$	--	$28000/\alpha$	8,380E04+	$71000/\alpha$	--	
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	--	570	-	3200	-	

* 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
 *** $\alpha = 16,22mrad$

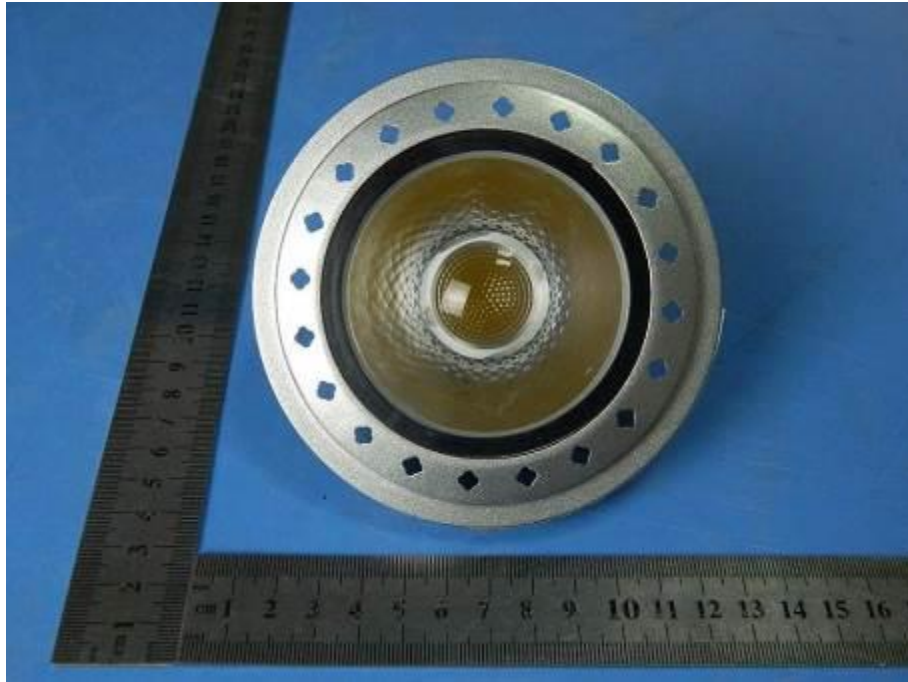
NOTE The action functions: see Table 4.1 and Table 4.2
 The applicable aperture diameters: see 4.2.1
 The limitations for the angular subtenses: see 4.2.2
 The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5.

Table 6.1		Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC) AR0216-AC850T with LUMINUS LED chip							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	--	--	--	--	--	
Near UV		E_{UVA}	$W \cdot m^{-2}$	0,33	--	--	--	--	--	
Blue light	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	--	10000	3,635E+03	4000000	--	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	0,01*	--	1,0	--	400	--	
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	$28000/\alpha^{***}$	--	$28000/\alpha$	$8,672E+04$	$71000/\alpha$	--	
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	--	570	-	3200	-	

* 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
 *** $\alpha = 15,81mrad$

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.

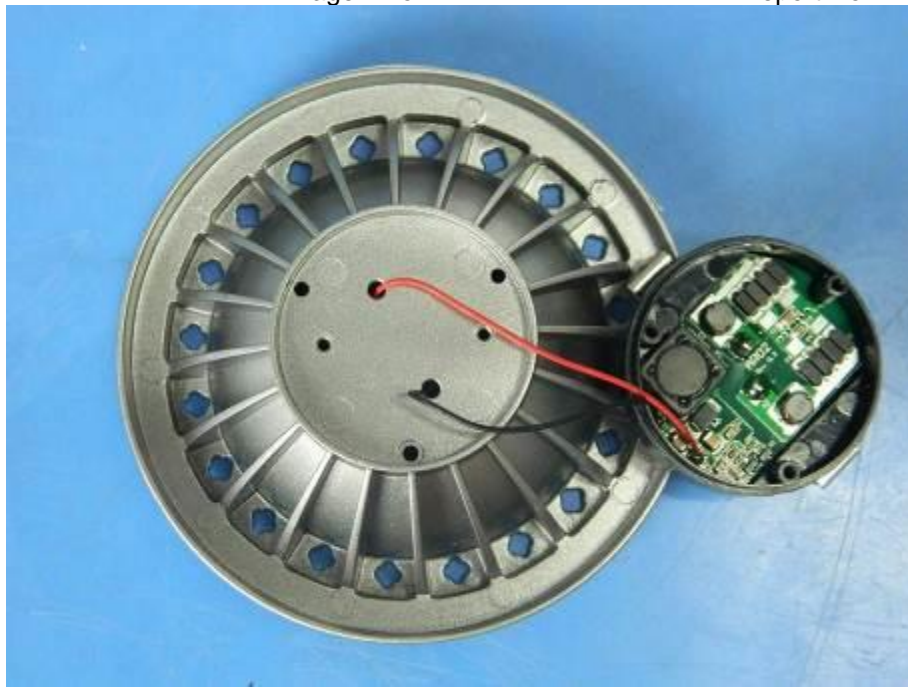
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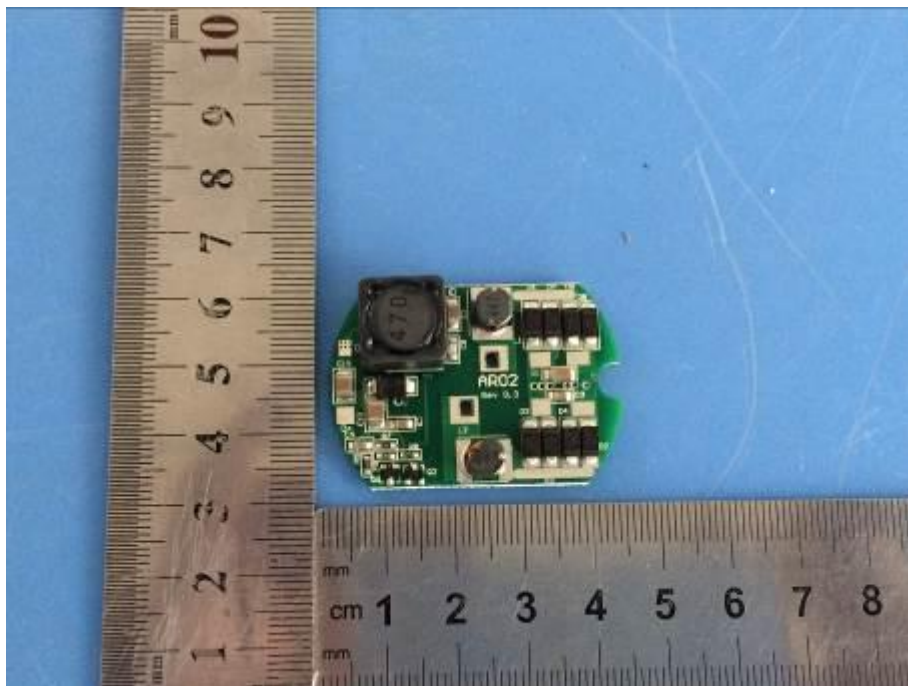
Picture 1: Front view of AR0216-AyzeT



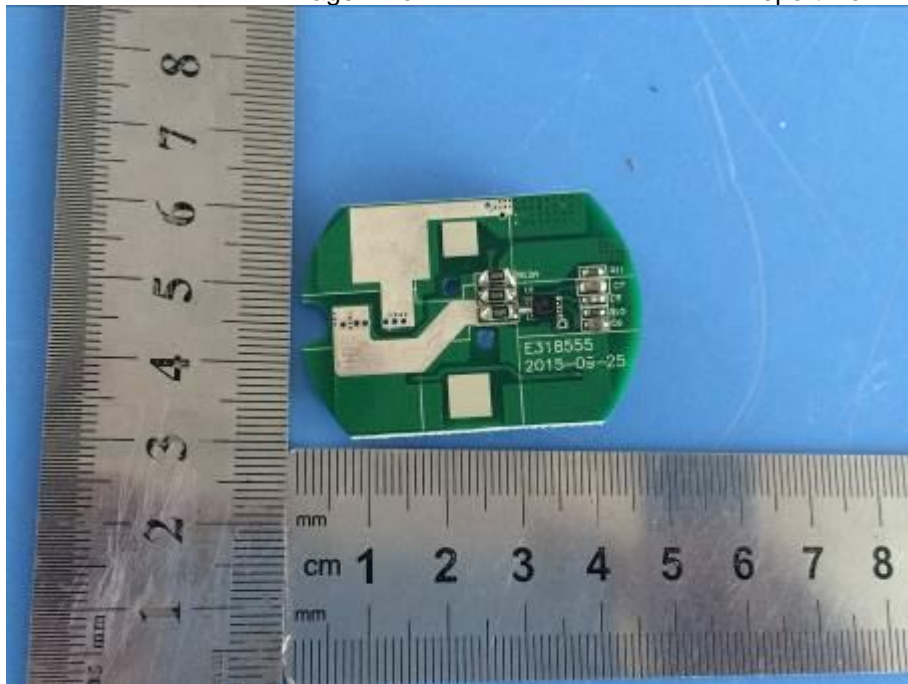
Picture 2: Rear view of AR0216-AyzeT



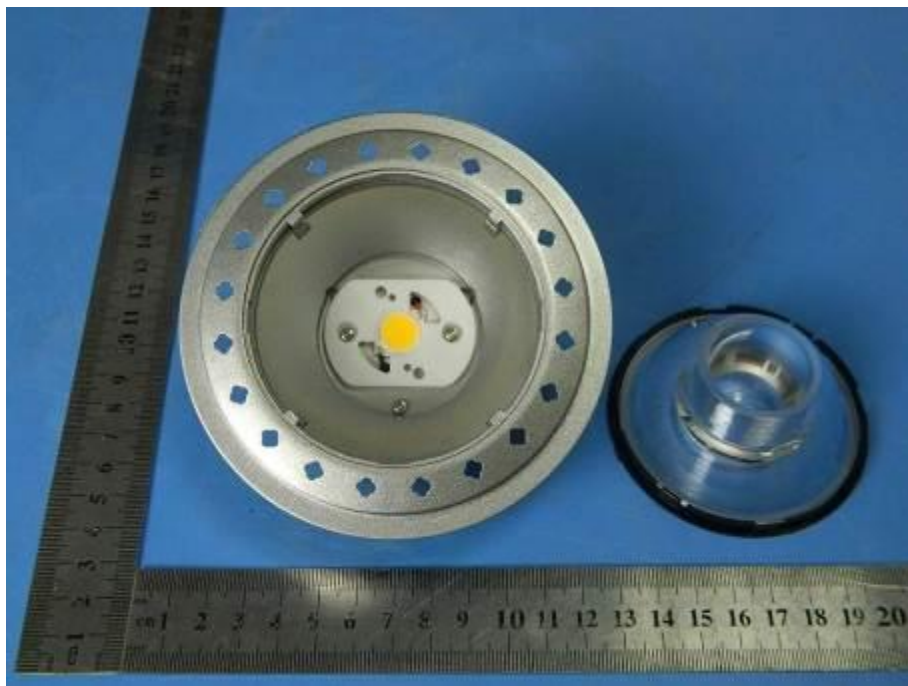
Picture 3: Inside view of AR0216-AyzeT



Picture 4: LED controlgear PCB top view of AR0216-AyzeT



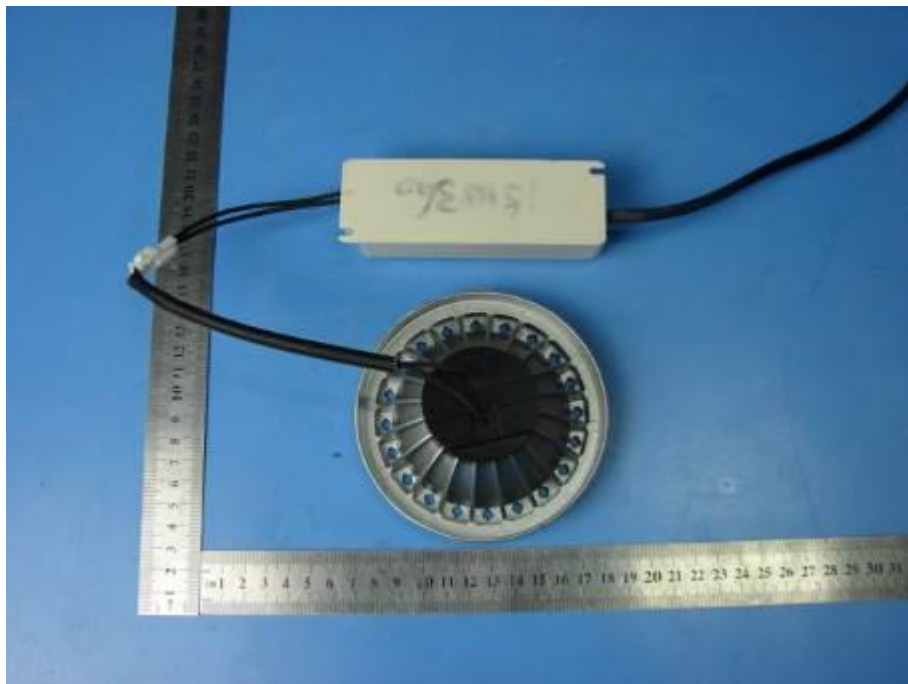
Picture 5: LED controlgear PCB bottom view of AR0216-AyzeT



Picture 6: LED module view of AR0216-AyzeT



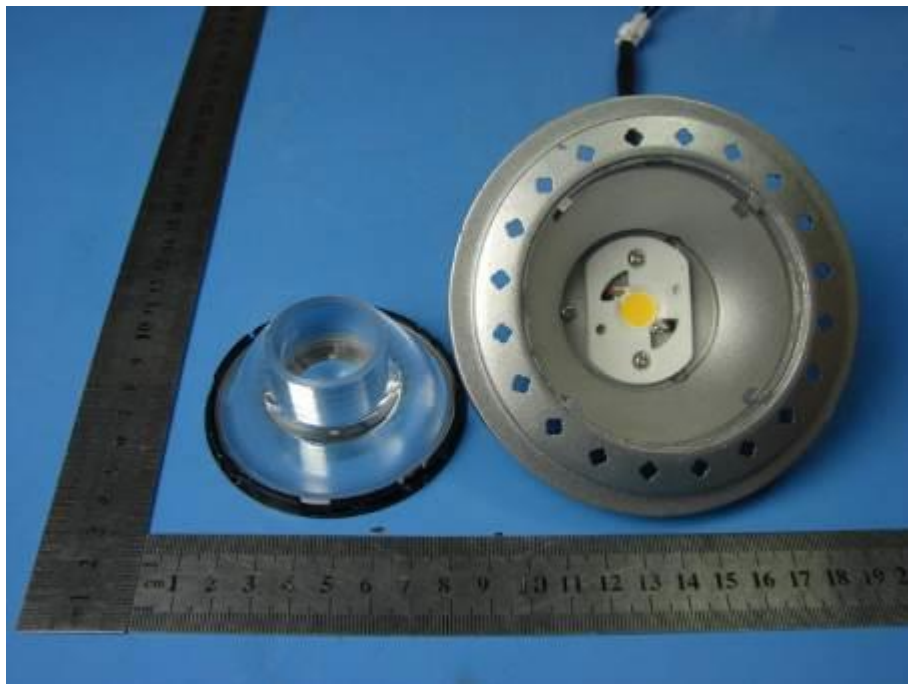
Picture 7: Front view of AR0216-ByzeT



Picture 8: Rear view of AR0216-ByzeT



Picture 9: Inside view of AR0216-ByzeT



Picture 10: LED module view of AR0216-ByzeT