




LVD TEST REPORT

Product Name: LED Sports Light :

Model Number: VT-500D VT-501D

Trade Name : 

Report No. : TK190108209-S-L

Date Of Issue : January 08 2019

Prepared For

V-TAC Exports Limited

Room No 301, Kam On Building, 176A Queens Road Central, Central, Hong Kong.

Prepared By

TOKE-TEST Laboratory Co., Ltd.

**No.7, Xinshidai Industrial Park, Guantian Village, Shiyan Town,
Bao'an District, Shenzhen, Guangdong, P.R.C.**

TOKE represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to the national and international reference standards based on SI Units.

TOKE's reports apply only to the specific samples tested under conditions. It is manufacturer's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **TOKE** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **TOKE** issued reports.

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EN 60598-1:2015		
Luminaires - Part 1: General requirements and tests		
EN 60598-2-1:1989		
Luminaires - Part 2: Particular requirements - Section 1: Fixed general purpose luminaires		
EN 62471:2008		
Photobiological safety of lamps and lamp systems		
EN 62493:2010		
Assessment of lighting equipment related to human exposure to electromagnetic fields		
Report reference No.:	TK190108209-S-L	
Testing laboratory	TOKE Laboratory Co., Ltd.	
Address.....:	Niulanqian Building,Minzhi Avenue,Longhua New District,Shenzhen City,Guangdong Province,china.	
Applicant.....:	V-TAC Exports Limited	
Address.....:	Room No 301, Kam On Building, 176A Queens Road Central, Central, Hong Kong.	
Manufacturer.....:	V-TAC Exports Limited	
Address.....:	Room No 301, Kam On Building, 176A Queens Road Central, Central, Hong Kong.	
Standards.....:	EN 60598-1:2008 EN 60598-2-1:1989 EN 62471:2008 EN 62493:2010	
Test procedure	LVD Scheme	
Procedure deviation.....:	N.A.	
Non-standard test method.....:	N.A.	
TRF originator.:	TOKE Laboratory Co., Ltd.	
Copyright blank test report.....:	TOKE Laboratory Co., Ltd.	
Test equipment description.....:	LED SPORTS LIGHT	
Trade mark.....:		
Model/Type designation.....:	For Page 3---modle list	
Rating.....:	AC100-240V, 50/60Hz	
Class of equipment.....:	Class I equipment	
Mass of equipment (Kg).....:	<20 kg	
Date(s) of performance of tests.....:	January 08 2019	
Compiled by (+signature):		 Ken Ruan/ Engineer



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Test item particulars	
Classification of installation and use : Class I	
Supply Connection :	
..... :	
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 :	
Date (s) of performance of tests : January 08 2019	
General remarks:	
The sample were tested according to	
EN 60598-1:2015	
Luminaires - Part 1: General requirements and tests	
EN 60598-2-1:1989	
Luminaires - Part 2: Particular requirements - Section 1: Fixed general purpose luminaires	
EN 62471:2008	
Photobiological safety of lamps and lamp systems	
EN 62493:2010	
Assessment of lighting equipment related to human exposure to electromagnetic fields	
Model list	VT-500D VT-501D




Copy of marking plate:

LED SPORTS LIGHT
Model: VT-500D
Input: AC100-240V 50/60Hz
Output: 500W

V-TAC Exports Limited



4	GENERAL REQUIREMENTS	P
4.1	The lamp shall be so designed and constructed that in normal use cause no danger to the user.	P
4.2	Self-ballasted LED-Lamp are non-repairable.	P

5	MARKING	P
5.1	Mandatory marking	P
	- mark of origin	P
	- rated supply voltage (V) : AC100-240V	P
	- rated wattage (W) :	P
	- rated frequency (Hz) : 50/60Hz	P
5.2	Addition marking	N
	- burning position	N
	- rated current (A) :	N
	- weight significantly higher	N
	- special conditions or restrictions	N
	Not suitable for dimming; symbol used 	P
	- eye protection	P
5.3	Marking durable and legible	P
	rubbing 15 s water, 15 s petroleum; marking legible	P

6	INTERCHANGEABILITY	P
6.1	Cap interchangeability in accordance with IEC 60061-1	P
	Gauge in accordance with IEC 60061-3	P
6.2	Bending moment, axial pull and mass	P
	Bending moment imparted by the lamp at the lampholder	P
	Lamp construction withstands axial pull (Nm) :	P
	Mass not exceeding value table 2 (kg) : <10kg	P



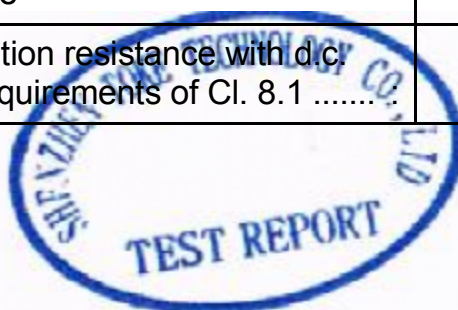
7	PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS		
	Internal, basic insulated or live metal parts not accessible		P
	Tested with a test finger with a force of 10 N		P
	Compliance checked with appropriate gauges		P

8	INSULATION RESISTANCE AND ELECTRIC STRENGTH		
8.2	After storage 48 h at 91-95% relative humidity and 20-30 °C measuring of insulation resistance with d.c. 500 V (MΩ):		P
	≥ 4 MΩ for double or reinforced insulation :		P
8.3	Immediately after clause 8.2 electric strength test for 1 min		P
	Double or reinforced insulation, 4U + 2000 V		P
	No flashover or breakdown		P

9	MECHANICAL STRENGTH		
	Torsion resistance of unused lamps		P
9.1	Torque test		P
	B 15 d Cap 1,15 Nm		N
	B 22 d Cap 3,0 Nm		N
	E 11 Cap 0,8 Nm		N
	E 12 Cap 0,8 Nm		N
	E 14 Cap 1,15 Nm		N
	E 17 Cap 1,5 Nm		N
	E 26 or E27 Cap 3,0 Nm		P
	GX 53 Cap 3,0 Nm	under consideration	N
9.2	Torsion resistance of lamps after a defined time of usage		P
	Torsion resistance of used lamp	under consideration.	P
9.3	Repetition of clause 8		P
	Clause 8 shall comply after the mechanical strength test.		P



10	CAP TEMPERATURE RISE		
	The cap temperature rise Δt_s of the lamp shall not exceed 120 K.		P
11	RESISTANCE TO HEAT		P
	Parts of insulating material retaining live parts in position, ball-pressure test:		P
	- part; test temperature (°C)		P
	- part; test temperature (°C)		P
12	RESISTANCE TO FLAME AND IGNITION		P
	External parts of insulating material preventing electric shock glow-wire test 650 °C		P
	- flame extinguished within 30 s		P
	- no flaming drops igniting tissue paper		P
13	FAULT CONDITIONS		P
13.2	Extreme electrical conditions (dimmable lamps)		P
	Lamp withstands overpower condition >15 min.		P
	Lamp fails safe after 15 min overpower condition		P
	Lamp with automatic protective device or power limiter, test performed 15 min. at limit.		P
13.3	Extreme electrical conditions (non-dimmable lamps)		P
	Tested according 13.2 (as far as possible)		P
13.4	Short-circuit across capacitors	(see appended table)	P
13.5	Fault conditions: where diagram indicates fault condition impairs safety, electronic components have been short-circuited or disconnected	(see appended table)	P
13.6	When operated under fault conditions the lamp		P
	- does not emit flames or molten material		P
	- does not produce flammable gases or smoke		P
	- live parts not accessible		P
	After the tests the insulation resistance with d.c. 1000 V complies with requirements of Cl. 8.1		P





14 (16)	CREEPAGE DISTANCES AND CLEARANCES		P
	Creep age distances and clearances according to Table 3 and 4 of IEC 61347-1, as appropriate	(see appended table)	P
	Printed boards see clause 14 of IEC 61347-1		P
	Insulating lining of metallic enclosures		P



15	TABLE: Ball Pressure Test of Thermoplastics		P
Allowed impression diameter (mm) :		2.0mm	—
Part	Test temperature (°C)	Impression diameter (mm)	
PCB of LED board	125	1.1	
Lamp cap	125	0.9	
PCB of LED driver	125	0.8	
Supplementary information:			

16	TABLE: tests of fault conditions		P
Part	Simulated fault	Result	Hazard
DB pin3-4	Short	0 A, 0 W, Fuse opened and DB damaged	NO
DC output	Short	0.1 A, 0 W, Unit shut down and recoverable.	NO
T1 outputs	short	0.1 A, 0 W, Unit shut down and recoverable.	NO

1716)	TABLE: Clearance And Creep age Distance Measurements					
clearance cl and creep age distance decry at/of:	Up (V)	U rams. (V)	Required cl (mm)	Measured cl (mm)	required cr (mm)	Measured cr (mm)
Live parts to enclosure	486	243	3.4	5.6	5.0	6.7
Line to neutral	339.4	240	1.7	2.6	2.5	2.6
Supplementary information:						



18	TABLE: tests of fault conditions		P
Part	Simulated fault	Result	Hazard
DB pin3-4	Short	0 A, 0 W, Fuse opened and DB damaged	NO
DC output	Short	0.1 A, 0 W, Unit shut down and recoverable.	NO
T1 outputs	short	0.1 A, 0 W, Unit shut down and recoverable.	NO

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Live parts to enclosure	486	243	3.4	5.6	5.0	6.7	
Line to neutral	339.4	240	1.7	2.6	2.5	2.6	
Supplementary information:							



object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity
PCB	HONGKONG KANGXIN MCPCB CO.,LTD	KX-L	MAX.130℃	UL 94	E476935
LENS	LG CHEM LTD	LUPOY GP-1006F(f1)	Rated 5VA,min.110℃ ,min2.5mm thick	UL 94	E67171
LED driver	MEAN WELL ENTERPRISE S CO LTD	HLG-240H-48A/B/AB	Input: 90-305VAC, 50/60Hz, 4A; Output: 48VDC, 5A; tc=90℃, IP67;	EN61347-1:2015 EN61347-2-13:2014+A1	E334687
Supply cord	Guangdong Rifeng Electric Co., Ltd	H05RN-F	300V 1.0mm ² *3C 105℃	EN 50525-2-21	VDE 40015999
(Alternate)	Ningbo Dabu Electric Appliance Co., Ltd.	H05RN-F	300V 1.0mm ² *3C 105℃	EN 50525-2-21	VDE 40030691
Supply cord for LED drivers	Guangdong Rifeng Electric Co., Ltd	H05RN-F	300V 1.5mm ² *2C 105℃	EN 50525-2-21	VDE 40015999
(Alternate)	Ningbo Dabu Electric Appliance Co., Ltd.	H05RN-F	300V 1.5mm ² *3C 105℃	EN 50525-2-21	VDE 40030691
LED	Philips	LUXEON 3030 2D	Vf:5.8-6.6V, If:240mA		
LED	Sansung	LM302Z	Vf:5.8-6.6V, If:240mA		



20	EXPOSURE LIMITS		P
20.1	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 104 cd.m-2	see clause 4.3	P
20.2	Hazard exposure limits		P
20.3	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 broad-band source, the effective integrated spectral irradiance , ES, of the light source shall not exceed the levels defined by:		P
	$E_s \cdot t = \sum_{200}^{400} \sum_t E_{\lambda}(\lambda, t) \cdot S_{UV}(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 30 \quad \text{J} \cdot \text{m}^{-2}$		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		P
	$t_{\max} = \frac{30}{E_s}$		P
20.4	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, EUVA, 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
	$t_{\max} \leq \frac{10000}{E_{UVA}}$		P

20.5	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
	$L_B \cdot t = \sum_{300}^{700} \sum_t L_{\lambda}(\lambda, t) \cdot B(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 10^6 \text{ J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	for $t \leq 10^4 \text{ s}$	P
	$L_B = \sum_{300}^{700} L_{\lambda} \cdot B(\lambda) \cdot \Delta \lambda \leq 100 \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	for $t > 10^4 \text{ s}$	P
20.6	Retinal blue light hazard exposure limit - small source		N
	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:		N
	$E_B \cdot t = \sum_{300}^{700} \sum_t E_{\lambda}(\lambda, t) \cdot B(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 100 \text{ J} \cdot \text{m}^{-2}$	for $t \leq 10^4 \text{ s}$	N
	$E_B = \sum_{300}^{700} E_{\lambda} \cdot B(\lambda) \cdot \Delta \lambda \leq 1 \text{ W} \cdot \text{m}^{-2}$	for $t > 10^4 \text{ s}$	N
20.7	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
	$L_R = \sum_{380}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta \lambda \leq \frac{50000}{\alpha \cdot t^{0.25}} \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	$(10 \mu\text{s} \leq t \leq 10 \text{ s})$	P
20.8	Retinal thermal hazard exposure limit – weak visual stimulus		N

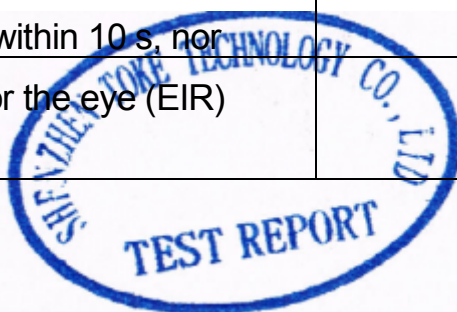


	For an infrared heat lamp or any near-infrared source where a weak visual stimulus is inadequate to activate the aversion response, the near infrared (780 nm to 1400 nm) radiance, LIR, as viewed by the eye for exposure times greater than 10 s shall be limited to:		N
	$L_{IR} = \sum_{780}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{6000}{\alpha} \quad W \cdot m^{-2} \cdot sr^{-1}$	t > 10 s	N
20.9	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, EIR, over the wavelength range 780 nm to 3000 nm, for times less than 1000 s, shall not exceed:		P
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 18000 \cdot t^{-0.75} \quad W \cdot m^{-2}$	t ≤ 1000 s	P
	For times greater than 1000 s the limit becomes:		P
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 100 \quad W \cdot m^{-2}$	t > 1000 s	P
20.10	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
	$E_H \cdot t = \sum_{380}^{3000} \sum_i E_{\lambda}(\lambda, t) \cdot \Delta t \cdot \Delta\lambda \leq 20000 \cdot t^{0.25} \quad J \cdot m^{-2}$		P
21	MEASUREMENT OF LAMPS AND LAMP SYSTEMS		P
21.1	Measurement conditions		P
	Measurement conditions shall be reported as part of the evaluation against the exposure limits and the assignment of risk classification.		P
21.2	Lamp ageing (seasoning)		N
	Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.		N
21.3	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.		P
21.4	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
21.5	Lamp operation		N
	Operation of the test lamp shall be provided in accordance with:		N
	-- the appropriate IEC lamp standard, or		N
	-- the manufacturer' s recommendation		N
21.6	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
	-- the manufacturer' s recommendation		P
21.7	Measurement procedure		P
21.8	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
21.9	Radiance measurements		P
21.9.1	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
21.9.2	Alternative method		P

	Alternatively to an imaging radiance set-up, an ir-radiance measurement set-up with a circular field stop placed at the source can be used to perform radiance measurements.		P
21.9.3	Measurement of source size		P
	The determination of α , the angle subtended by a source, requires the determination of the 50% emission points of the source.		P
21.9.4	Pulse width measurement for pulsed sources		N
	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
21.9.5	Analysis methods		P
21.9.6	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 de-sired.		P
21.9.7	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
21.9.8	Measurement uncertainty	See Annex C in the norm	P
	The quality of all measurement results must be quantified by an analysis of the uncertainty.		P
22	LAMP CLASSIFICATION		--
	For the purposes of this standard it was decided that the values shall be reported as follows:		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		P
	-- for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm		N
22.1	Continuous wave lamps		P
22.1.1	Exempt Group		P
	In the exempt group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not pose:		P
	-- an actinic ultraviolet hazard (ES) within 8-hours exposure (30000 s), nor		P
	-- a near-UV hazard (EUVA) within 1000 s, (about 16 min), nor		P
	-- a retinal blue-light hazard (LB) within 10000 s (about 2,8 h), nor		P
	-- a retinal thermal hazard (LR) within 10 s, nor		P
	-- an infrared radiation hazard for the eye (EIR) within 1000 s		P
22.1.2	Risk Group 1 (Low-Risk)		N
	In this group are lamps, which exceeds the limits for the exempt group but that does not pose:		N
	-- an actinic ultraviolet hazard (ES) within 10000 s, nor		N
	-- a near ultraviolet hazard (EUVA) within 300 s, nor		N
	-- a retinal blue-light hazard (LB) within 100 s, nor		N
	-- a retinal thermal hazard (LR) within 10 s, nor		N
	-- an infrared radiation hazard for the eye (EIR) within 100 s		N



	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (LIR), within 100 s are in Risk Group 1.		N
22.1.3	Risk Group 2 (Moderate-Risk)		N
	This requirement is met by any lamp that exceeds the limits for Risk Group 1, but that does not pose:		N
	-- an actinic ultraviolet hazard (ES) within 1000 exposure, nor		N
	-- a near ultraviolet hazard (EUVA) within 100 s, nor		N
	-- a retinal blue-light hazard (LB) within 0,25 s (aversion response), nor		N
	-- a retinal thermal hazard (LR) within 0,25 (aversion response), nor		N
	-- an infrared radiation hazard for the eye (EIR) within 10 s		N
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (LIR), within 10 s are in Risk Group 2.		N
22.1.4	Risk Group 3 (High-Risk)		N
	Lamps which exceed the limits for Risk Group 2 are in Group 3.		N
22.2	Pulsed lamps		N
	Pulse lamp criteria shall apply to a single pulse and to any group of pulses within 0,25 s.		N
	A pulsed lamp shall be evaluated at the highest nominal energy loading as specified by the manufacturer.		N
	The risk group determination of the lamp being tested shall be made as follows:		N
	-- a lamp that exceeds the exposure limit shall be classified as belonging to Risk Group 3(High-Risk)		N

	-- 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
	-- 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

Table 4.1		Spectral weighting function for assessing ultraviolet hazards for skin and eye		P
Wavelength¹ 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

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	0.1	1.0
405	0.2	2.0
410	0.4	4.0
415	0.8	8.0
420	0.9	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	-	$10[(700-\lambda)/500]$
1050-1150	-	0.2
1150-1200		$0,2 \cdot 100,02(1150-\lambda)$
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·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·m-2·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·√(t/10) 0,011 0,0011·√t 0,1	106/t 106/t 106/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 ·√(t/10)	50000/(α·t 0,25) 50000/(α·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	



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	SUV(λ)	E_s	W•m-2	0.001	<0.0005	0.003	--	0.03	--
Near UV	-	E_{uva}	W•m-2	10	<0.0005	33	--	100	--
Blue light	B(λ)	L_B	W•m-2	100	3.8	10000	--	4000000	--
Blue light, small source	B(λ)	E_B	W•m-2	1.0	--	1.0	--	400	--
Retinal thermal	R(λ)	L_R	W•m-2	28000/a	225.5	28000/a	--	71000/a	--
Retinal Thermal, Weak visual stimulus	R(λ)	L_{IR}	W•m-2•sr	6000/a	--	6000/a	--	6000/a	--
IR radiation, eye	--	E_{IR}	W•m-2	100	0.08	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





List of test equipment used:

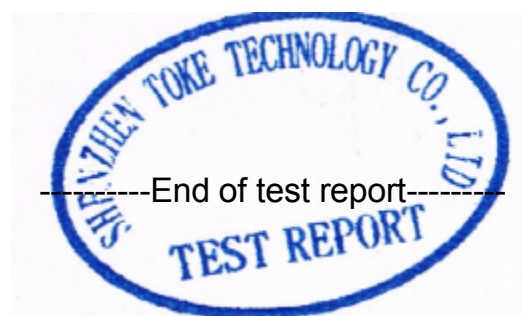
Clause	Measurement / testing	Testing /measuring equipment /material used	Range used	Calibration date
5	Irradiance and Radiance measurements	Spectroradiometer	200-3000 nm	Last cal. date: 2018-10-07 Next cal. date: 2019-10-06



Appendix:

EUT Photo

PHOTO 1	PHOTO 2
	
PHOTO 3	PHOTO 4
	



Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the SHENZHEN TOKE LABORATORY CO.,LTD. (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the Company and any person, firm or company requesting its services (the "Clients").
2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
4. The Report refers only to the sample tested and does not apply to the bulk, unless the sampling has been carried out by the Company and is stated as such in the Report.
5. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
6. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
7. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
8. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of ten years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.