

<b>TEST REPORT</b> <b>IEC 62471:2006 and EN 62471:2008</b> <b>Photobiological safety of lamps and lamp systems</b>	
Report reference No .....	RDG190429050-SF
Compiled by (+ signature) .....	Engineer: Phil Zhang <i>Phil Zhang</i>
Approved by (+ signature) .....	Project Engineer: Harrison Huang <i>Harrison Huang</i>
Date of issue .....	2019-04-30
Testing laboratory .....	Bay Area Compliance Laboratories Corp. (Dongguan)
Address .....	No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China
Testing location .....	Same as above
Applicant .....	Guangzhou Tianxin Photoelectric Co., Ltd.
Address .....	#56 Magangling Shima Village Junhe Street Baiyun District Guangzhou P.R.China 510440
Standard .....	IEC 62471:2006 EN 62471:2008
Test sample(s) received.....	2018-06-07
Test in period.....	2018-06-11
Procedure deviation .....	N.A.
Non-standard test method .....	N.A.
<p><b>Note:</b> The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the specific product described herein. It must not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).</p>	
Type of test object .....	Tunable White COB Series
Trademark .....	N.A.
Model/type reference .....	1512SW
Manufacturer.....	Guangzhou Tianxin Photoelectric Co., Ltd. #56 Magangling Shima Village Junhe Street Baiyun District Guangzhou P.R.China 510440
Rating .....	Input: 34Vdc-37Vdc, 350mA
Copy of marking plate:	None

**Test item particulars**

Tested lamp .....: Tunable White COB Series  
 Tested lamp system .....: N.A

**Lamp classification group.....: Risk Group 1**

Lamp cap .....: N.A  
 Bulb.....: N.A  
 Rated of the lamp .....: See rating  
 Furthermore marking on the lamp.....: N.A.  
 Seasoning of lamps according EN standard .....: No seasoning  
 Used measurement instrument.....: See appendix B for details  
 Temperature by measurement.....: 25.5°C  
 Information for safety use.....: N.A

**Possible test case verdicts:**

-test case does not apply to the test object.....:N(.A.)  
 -test object does meet the requirement.....:P(ass)  
 -test object does not meet the requirement.....:F(ail)

**General remarks:**

The test results presented in this report relate only to the object tested.  
 This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.  
 "(See Enclosure #)" refers to additional information appended to the report.  
 "(See appended table)" refers to a table appended to the report.  
 Throughout this report a point is used as the decimal separator.  
 List of test equipment must be kept on file and available for review.

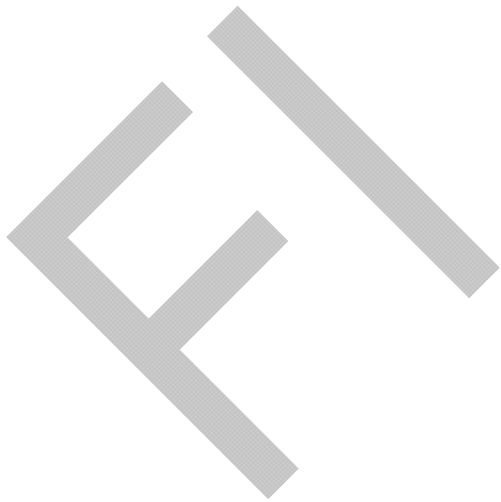
**Remark:**

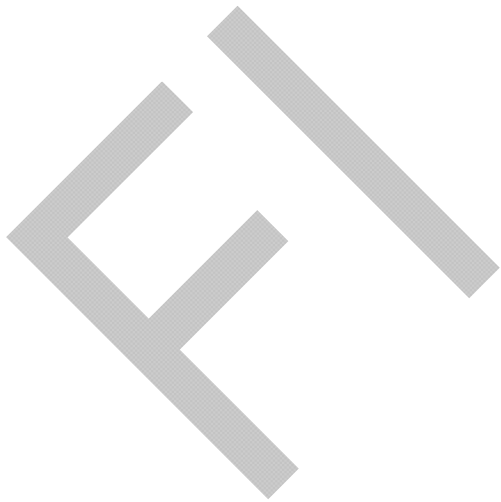
**Appendix A - EUT photos**  
**Appendix B - Test equipment list**

**General Product Information:**

"EUT" as referred in this report is Tunable White COB Series. Input: 34Vdc-37Vdc, 350mA.

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IEC/EN 62471			
Clause	Requirement – Test	Result - Remark	Verdict
	Operation of the test lamp shall be provided in accordance with:		P
	– the appropriate EN lamp standard, or		N
	– the manufacturer' s recommendation		P
5.1.5	Lamp system operation		N
	The power source for operation of the test lamp shall be provided in accordance with:		N
	– the appropriate EN standard, or		N
	– the manufacturer' s recommendation		N
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.	See appendix B	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
	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
5.2.3	Measurement of source size		P
	The determination of $\alpha$ , the angle subtended by a source, requires the determination of the 50% emission points of the source.	$\alpha = 0.0435$	P
5.2.4	Pulse width measurement for pulsed sources		N
	The determination of $\Delta t$ , the nominal pulse duration of a source, requires the determination of the time during which the emission is > 50% of its peak value.		N
5.3	Analysis methods		P
5.3.1	Weighting curve interpolations		N
	To standardize interpolated values, use linear interpolation on the log of given values to obtain intermediate points at the wavelength intervals desired.		N
5.3.2	Calculations		P



IEC/EN 62471			
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	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 s 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 s (aversion response), nor		N
	– an infrared radiation hazard for the eyelithin.1497 TD-.0001 Tc-.0039 Tw[(1)17.9(T00 s, )]Tatios.2754		N

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IEC/EN 62471			
Clause	Requirement – Test	Result - Remark	Verdict

Table 4.1		Spectral weighting function for assessing ultraviolet hazards for skin and eye		-
Wavelength <sup>1</sup> , nm	UV hazard function S <sub>uv</sub> ( )	Wavelength, nm	UV hazard function S <sub>uv</sub> ( )	
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	

<sup>1</sup> Wavelengths chosen are representative: other values should be obtained by logarithmic interpolation at intermediate wavelengths.

\* Emission lines of a mercury discharge spectrum.

IEC/EN 62471			
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Table 4.2	Spectral weighting functions for assessing retinal hazards from broadband optical sources		-
Wavelength nm	Blue-light hazard function B( )	Burn hazard function R( )	
300	0,01	-	
305	0,01	-	
310	0,01	-	
315	0,01	-	
320	0,01	-	
325	0,01	-	
330	0,01	-	
335	0,01	-	
340	0,01	-	
345	0,01	-	
350	0,01	-	
355	0,01	-	
360	0,01	-	
365	0,01	-	
370	0,01	-	
375	0,01	-	
380	0,01	0,1	
385	0,013	0,13	
390	0,025	0,25	
395	0,05	0,5	
400	0,10	1,0	
405	0,20	2,0	
410	0,40	4,0	
415	0,80	8,0	
420	0,90	9,0	
425	0,95	9,5	
430	0,98	9,8	
435	1,00	10,0	
440	1,00	10,0	
445	0,97	9,7	
450	0,94	9,4	
455	0,90	9,0	
460	0,80	8,0	
465	0,70	7,0	
470	0,62	6,2	
475	0,55	5,5	
480	0,45	4,5	
485	0,40	4,0	
490	0,22	2,2	
495	0,16	1,6	
500-600	$10^{[(450-\lambda)/50]}$	1,0	
600-700	0,001	1,0	
700-1050	0,013	$10^{[(700-\lambda)/500]}$	
1050-1150	0,025	0,2	
1150-1200	0,05	$0,2 \cdot 100 \cdot 0,2^{(1150-\lambda)}$	
1200-1400	0,10	0,02	

\* Wavelengths chosen are representative: other values should be obtained by logarithmic interpolation at intermediate wavelengths.

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IEC/EN 62471			
Clause	Requirement – Test	Result - Remark	Verdict

For IEC 62471:

Table 6.1	Emission limits for risk groups of continuous wave lamps		P
Risk			

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IEC/EN 62471			
Clause	Requirement – Test	Result - Remark	Verdict

For EN 62471:

Table 6.1	Emission limits for risk groups of continuous wave lamps based on Directive(2006/25/EC)								P
Risk	Action spectrum	Units	Symbol	Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	Suv( $\lambda$ )	W.m <sup>-2</sup>	E <sub>S</sub>	0.001	-	0.003	4.3x10 <sup>-4</sup>	0.03	-
Near UV		W.m <sup>-2</sup>	E <sub>UVA</sub>	0.33	-	33	1.3x10 <sup>-3</sup>	100	-
Blue light	B( $\lambda$ )	W.m <sup>-2</sup> .sr <sup>-1</sup>	L <sub>B</sub>	100	-	10000	8.63x10 <sup>3</sup>	4000000	-
Blue light,small source	B( $\lambda$ )	W.m <sup>-2</sup>	E <sub>B</sub>	0.01	-	1.0	-	400	-
Retinal thermal	R( $\lambda$ )	W.m <sup>-2</sup> .sr <sup>-1</sup>	L <sub>R</sub>	28000/ $\alpha$ ( $\alpha=0.0435$ )	-	28000/ $\alpha$ ( $\alpha=0.0435$ )	1.1x10 <sup>5</sup>	71000/ $\alpha$ ( $\alpha=0.0435$ )	-
Retinal thermal, Weak visual stimulus**	R( $\lambda$ )	W.m <sup>-2</sup> .sr <sup>-1</sup>	L <sub>IR</sub>	6000/ $\alpha$ ( $\alpha=0.0435$ )	-	6000/ $\alpha$ ( $\alpha=0.0435$ )	4.7 x10 <sup>1</sup>	6000/ $\alpha$ ( $\alpha=0.0435$ )	-
IR radiation Eye		W.m <sup>-2</sup>	E <sub>IR</sub>	100	-	570	4.4	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

NOTE The action functions: see Table 4.1 and Table 4.2

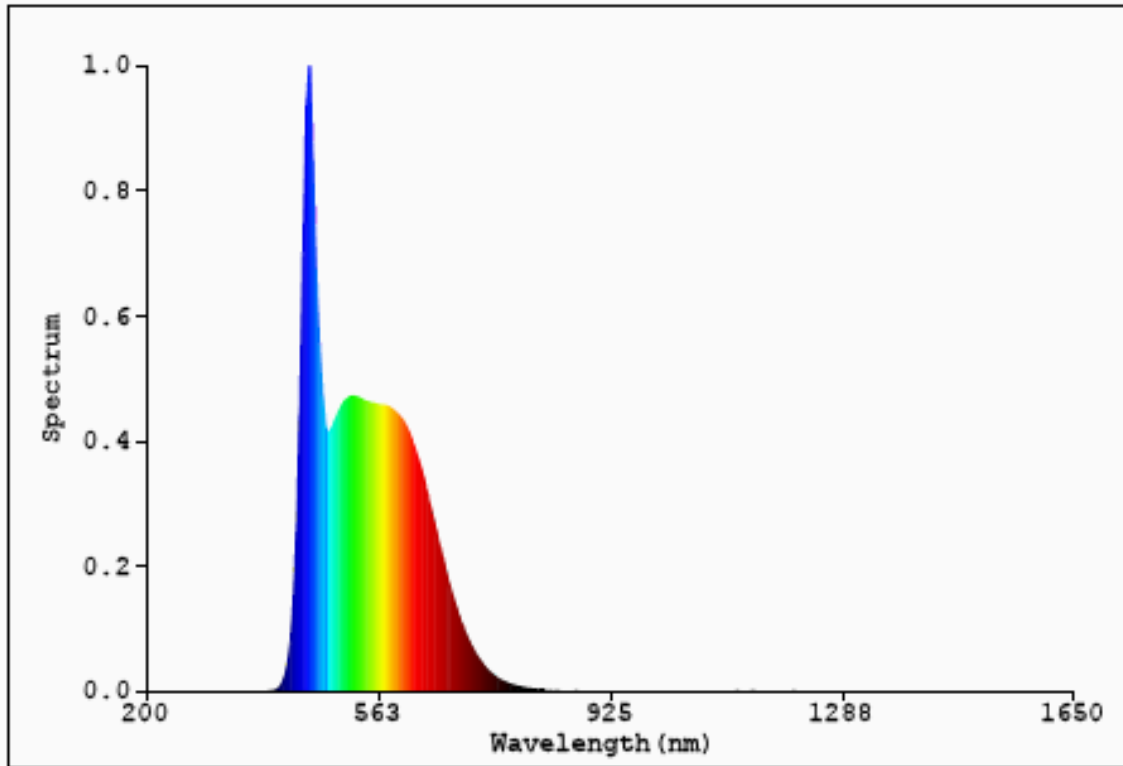
The applicance apertuer diameters: see 4.2.1

The limitations for the angular subtenses: see 4.2.2

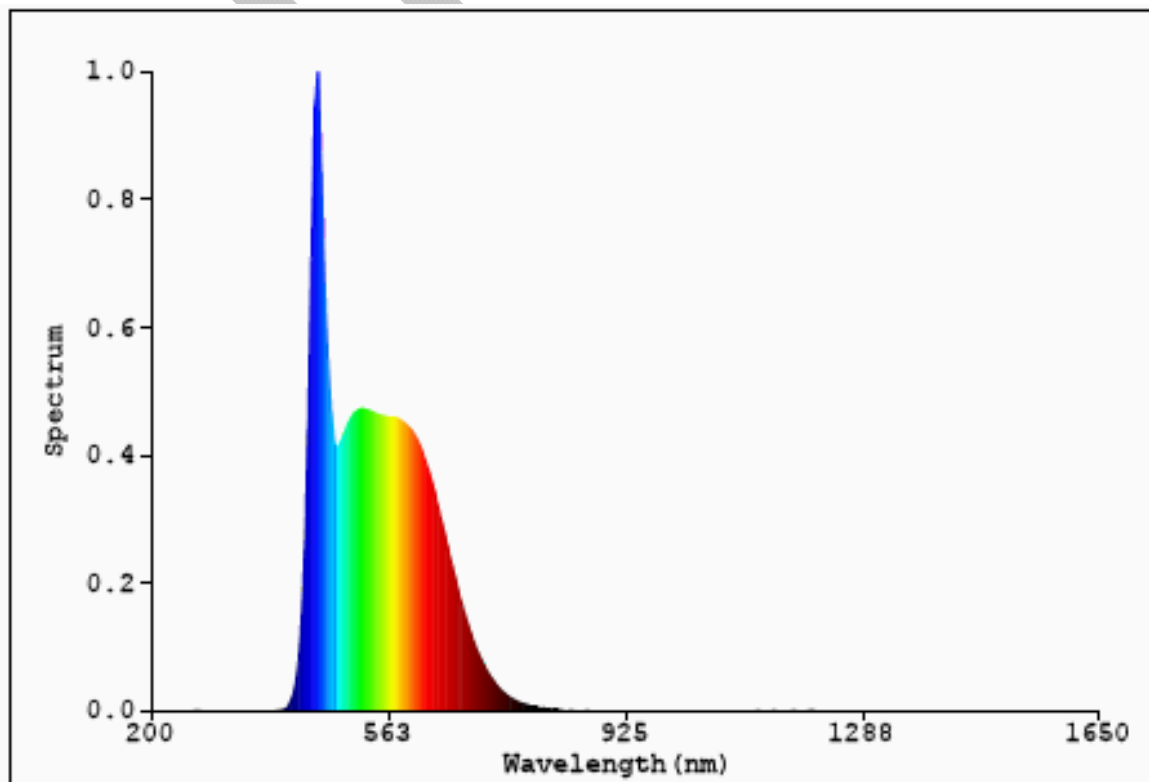
The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5

### Figure of Spectral distribution

For IEC 62471

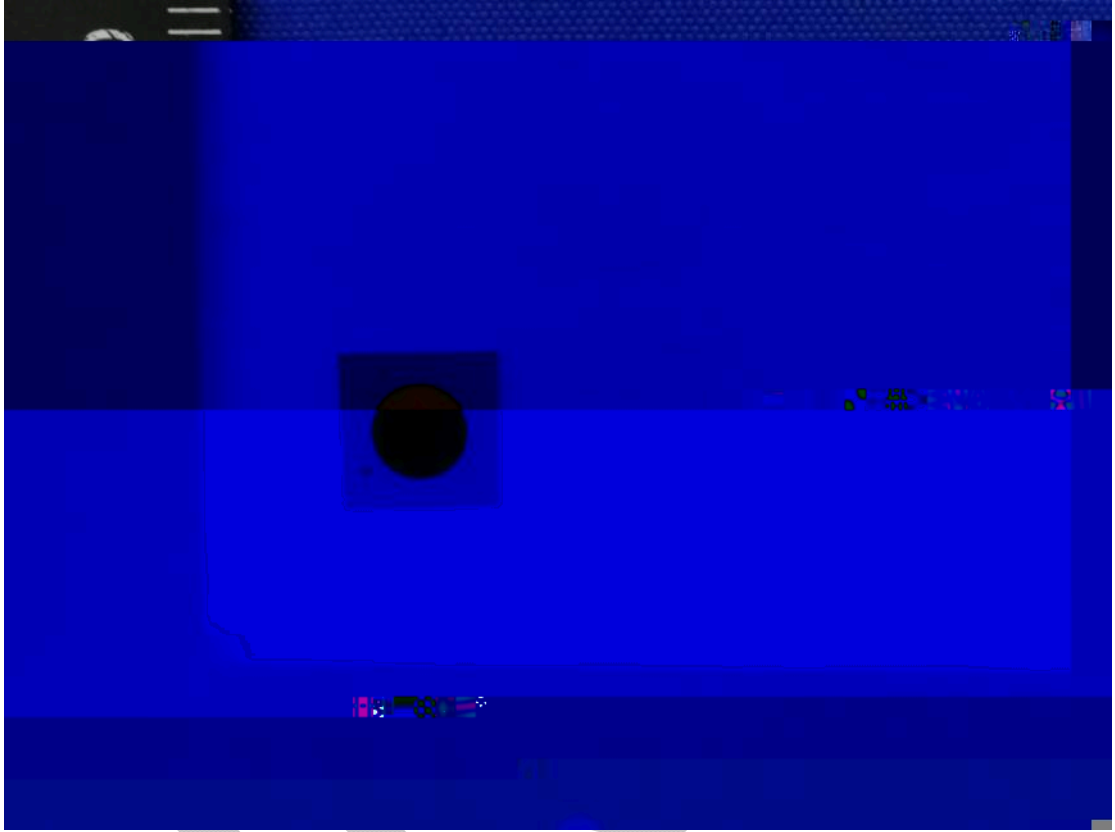


For EN 62471



## Appendix A - EUT Photos

The overall view of EUT





## Appendix B - Test equipment list

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Equipment Description	Model No	BACL#	Manufacturer	Last Cal	Cal Due
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