








TEST REPORT	
IEC 62471:2006	
Photobiological safety of lamps and lamp systems	
Report reference No .	BSTXD210315959601SR
Date of issue	Apr. 14, 2021
Testing laboratory	BST Testing (Shenzhen) Co.,Ltd.
Address	No.7, New Era Industrial Zone, Guantian, Bao'an District, Shenzhen, Guangdong, China
Testing location	As above
Applicant	EASTLIKE LED COMPANY
Address	Room B3, 18/F Bonsun Industrial Building,364-366 Sha Tsui Road, Tsuen Wan, Hong Kong .
Standard	IEC 62471:2006
Test sample(s) received	Apr. 08-14, 2021
Test in period	Apr. 14, 2021
Procedure deviation	N.A.
Non-standard test method	N.A.
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Type of test object	LED TUBE
Trademark	
Model/type reference	EL-I1234, EL-I0606,EL-I0609,EL-I0912,EL-I1213, EL-I1218,EL-I1522
Manufacturer	EASTLIKE LED COMPANY
Rating	AC100-240V, 50Hz ,180mA · 34W



Label for EL-I1234 (Representative):

LED TUBE
Model: EL-I1234
Rating(s): AC100-240V~, 180mA, 50Hz, 34W

EASTLIKE LED COMPANY.

Prepared by :

Apple Li
Engineer

Reviewer :

Sabon
Supervisor

Approved & Authorized Signer : _____



Andy Yan / Manager



Test item particulars

Tested lamp:Continuous wave lamps
Tested lamp system: According to lamp manufacture's recommendation
Lamp classification group.....:Exempt group
Lamp cap: N.A.
Bulb.....: N.A.
Rated of the lamp:See page 5
Furthermore marking on the lamp.....: N.A.
Seasoning of lamps according EN standard: Seasoned for 24h before measurement
Used measurement instrument.....:N.A.
Temperature by measurement.....: 25°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.
This report consists of 14 pages and following appendices: Appendix A EUT photos

General product information:

1) Description of the product

-The product tested with model namelisted below are LED street lamp provided in concordance with the requirements of IEC 62471:2006

See total model list:

	Product name	Model number
Basic	LED TUBE	EL-I1234
Additional	LED TUBE	EL-I0606,EL-I0609,EL-I0912, EL-I1213,EL-I1218,EL-I1522
Except for the model number is different, the additional models are exactly same in shape of enclosure, construction,material and electronic circuit with the basic model LT-I1522		

*** Factory information:**

Factory: EASTLIKE LED COMPANY

Address: Room B3, 18/F Bonsun Industrial Building,364-366 Sha Tsui Road, Tsuen Wan, Hong Kong .

*** Manufacturer's name or trade-mark of identification mark:**

EASTLIKE LED COMPANY

Trade-mark: 



IEC 62471:2006			
Clause	Requirement + Test	Result - Remark	Verdi
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	Conform	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
4.3	Hazard exposure limits		P
4.3.1	Actinic UV hazard exposure limit for the skin and eye		P
	The exposure limit for effective radiant exposure is 30 J.m ⁻² within any 8-hour period	Conform	P
	To protect against injury of the eye or skin from ultraviolet radiation exposure produced by a broadband source, the effective integrated spectral irradiance, E _s , of the light source shall not exceed the levels defined by:		P
	$E_s \cdot t = \sum_{200}^{400} E_\lambda(\lambda, t) \cdot s_{uv}(\lambda) \cdot \Delta\lambda \leq 30 \text{ J.m}^{-2}$		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		P
	$t_{max} = 30/E_s \geq 30000s$		P
4.3.2	Near-UV hazard exposure limit for eye		P
	For the spectral region 315 nm to 400 nm (UV-A) the total radiant exposure to the eye shall not exceed 10000 J.m ⁻² for exposure times less than 1000s. For exposure times greater than 1000 s (approximately 16 minutes) the UV-A irradiance for the unprotected eye, E _{UVA} , shall not exceed 10 W.m ⁻²		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s,		P
	$t_{max} \leq 10000/E_{UVA} \text{ s}$		P
4.3.3	Retinal blue light hazard exposure limit		P
	To protect against retinal photochemical injury from chronic blue-light exposure, the integrated spectral radiance of the light source weighted against the blue-light hazard function, B(λ), i.e., the blue-light weighted radiance, LB, shall not exceed the levels defined by:		P



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	$L_B \cdot t = \sum_{300}^{700} L_{\lambda}(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 10^6 \text{ J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$		P
	$L_B = \sum_{300}^{700} L_{\lambda} \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$		N
4.3.4	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: see table 4.2	See table 4.2	N
	$E_B \cdot t = \sum_{300}^{700} E_{\lambda}(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \text{ J} \cdot \text{m}^{-2}$		N
	$E_B = \sum_{300}^{700} E_{\lambda} \cdot B(\lambda) \cdot \Delta\lambda \leq 1 \text{ W} \cdot \text{m}^{-2}$		N
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
	$L_R = \sum_{380}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{50000}{\alpha \cdot t^{0.25}} \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$		P
4.3.6	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, L_{IR} , as viewed by the eye for exposure times greater than 10 s shall be limited to:		N
	$L_{IR} = \sum_{780}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{6000}{\alpha} \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$		N
4.3.7	Infrared radiation hazard exposure limits for the eye		P
	The avoid thermal injury of the cornea and possible delayed effects upon the lens of the eye (cataractogenesis), ocular exposure to infrared radiation, E_{IR} , over the wavelength range 780 nm to 3000 nm, for times less than 1000 s, shall not exceed:		P



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	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 18000 \cdot t^{-0,75} \quad W \cdot m^{-2}$		P
	For times greater than 1000 s the limit becomes:		N
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 100 \quad W \cdot m^{-2}$		N
4.3.8	Thermal hazard exposure limit for the skin		N
	Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:		N
	$E_H \cdot t = \sum_{380}^{3000} \sum_t E_{\lambda}(\lambda, t) \cdot \Delta t \cdot \Delta\lambda \leq 20000 \cdot t^{0,25} \quad J \cdot m^{-2}$		N
5	MEASUREMENT OF LAMPS AND LAMP SYSTEMS		P
5.1	Measurement conditions	Seasoned for 24h before measurement	P
	Measurement conditions shall be reported as part of the evaluation against the exposure limits and the assignment of risk classification.	See above	P
5.1.1	Lamp ageing (seasoning)	See above	P
	Seasoning of lamps shall be done as stated in the AppropriateEN lamp standard.	Under manufacture's	P
5.1.2	Test environment	Under manufacture's	P
	For specific test conditions, see the appropriateEN lamp standard or in absence of such standards, the appropriate national standards or manufacturer's recommendations.	Under manufacture's recommendation	P
5.1.3	Extraneous radiation	Considered	P
	Careful checks should be made to ensure that extraneous sources of radiation and reflections do not add significantly to the measurement	Considered	P
5.1.4	Lamp operation	Under manufacture's	P
	Operation of the test lamp shall be provided in accordance with:		P
	– the appropriateEN lamp standard, or		N
	– the manufacturer' s recommendation		P
5.1.5	Lamp system operation		P
	The power source for operation of the test lamp shall be provided in accordance with:		P



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	– the appropriateEN standard, or		N
	– 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		
	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		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 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		N
	The determination of Δt , the nominal pulse durationof a source, requires the determination of the timeduring which the emission is > 50% of its peakvalue.		N
5.3	Analysis methods		P
5.3.1	Weighting curve interpolations		P
	To standardize interpolated values, use linear interpolation on the log of given values to obtain intermediate points at the wavelength intervals desired.	see table 4.1	P
5.3.2	Calculations		P
	The calculation of source hazard values shall be performed by weighting the spectral scan by the appropriate function and calculating the total weighted energy.		P
5.3.3	Measurement uncertainty		P



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	The quality of all measurement results must be quantified by an analysis of the		P
6	LAMP CLASSIFICATION		P
	For the purposes of this standard it was decided that the values shall be reported as	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		P
	– for all other light sources, including pulsed lamp sources, the hazard values shall be reported at		P
6.1	Continuous wave lamps		P
6.1.1	Exempt Group		P
	In the except group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not		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
6.1.2	Risk Group 1 (Low-Risk)	Exempt Group provided	N
	In this group are lamps, which exceeds the limits for the except group but that does not		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
6.1.3	Risk Group 2 (Moderate-Risk)	Exempt Group provided	N
	This requirement is met by any lamp that exceeds the limits for Risk Group 1, but that		N
	– an actinic ultraviolet hazard (ES) within 1000 s exposure, nor		N



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	– 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 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
6.1.4	Risk Group 3 (High-Risk)	Exempt Group provided	N
	Lamps which exceed the limits for Risk Group 2 are in Group 3.		N
6.2	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			N
Wavelength λ, nm	UV hazard function S _{UV} (λ)	Wavelength λ, nm	UV hazard function S _{UV} (λ)	
200 0	0.030	313* 0	0.006	
205 0	0.051	315 0	0.003	
210 0	0.075	316 0	0.0024	
215 0	0.095	317 0	0.0020	
220 0	0.120	318 0	0.0016	
225 0	0.150	319 0	0.0012	
230 0	0.190	320 0	0.0010	
235 0	0.240	322 0	0.00067	
245 0	0.360	325 0	0.00050	



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Clause	Requirement +Test		Result - Remark	Verdi
250 0	0.430	328 0	0.00044	
254* 0	0.500	330 0	0.00041	
255 0	0.520	333* 0	0.00037	
260 0	0.650	335 0	0.00034	
265 0	0.810	340 0	0.00028	
270 1	0.000	345 0	0.00024	
275 0	0.960	350 0	0.00020	
280* 0	0.880	355 0	0.00016	
285 0	0.770	360 0	0.00013	
290 0	0.640	365* 0	0.00011	
295 0	0.540	370 0	0.000093	
297* 0	0.460	375 0	0.000077	
300 0	0.300	380 0	0.000064	
303* 0	0.120	385 0	0.000053	
305 0	0.060	390 0	0.000044	
308 0	0.026	395 0	0.000036	
310 0	0.015	400 0	0.000030	
<p>* Wavelengths chosen are representative: other values should be obtained by logarithmic interpolation at intermediate wavelengths.</p> <p>* Emission lines of a mercury discharge spectrum.</p>				

Table 4.2	Spectral weighting functions for assessing retinal hazards from broadband optical sources		-
Wavelength nm	Blue-light hazard function	Burn hazard function	
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	



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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	$0,2 \cdot 100.02^{(1150-\lambda)}$
1200-1400		0,10	0,02

2) 1 Wavelengths chosen are representative: other values should be obtained by logarithmic interpolation at intermediate wavelengths.

3) Emission lines of a mercury discharge spectrum.

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

Table 5.5 Summary of the ELs for the retina (radiance based values)					
Hazard Name	Relevant equation	Wavelength Range	Exposure duration	Field of view radians	EL in terms of constant



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Blue light	$LB = \sum L_{\lambda} \cdot B(\lambda) \cdot \Delta\lambda$	300-700	0.25-10 10-100 100-10000 10000	0.011.(t/10) 0.011 0.0011.t 0.1	W.m⁻².sr⁻¹ 10 ⁶ /t 10 ⁶ /t 10 ⁶ /t 100
Retinal	$LR = \sum L_{\lambda} \cdot R(\lambda) \cdot \Delta\lambda$	380-1400	<0.25 0.25-10	0.0017 0.011.(t/10)	50000/(.t ^{0.25}) 50000/(.t ^{0.25})
Retinal thermal(weak visual stimulus)	$LIR = \sum L_{\lambda} \cdot R(\lambda) \cdot \Delta\lambda$	780-1400	>10	0.011	6000/

Table 6.1 Emission limits for risk groups of continuous wave lamps										P
Risk	Action spectrum	Units	Symbol	Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actini	Suv(λ)	W.m ⁻²	E _S	0.00	0.00e+00	0.00	5.62e-03	0.03	0.00e+00	
Near		W.m ⁻²	E _{UVA}	0.9	0	33.0	0	100.	0	
Blue	B(λ)	W.m ⁻²	L _B	100		1000	5.66e+05	40000	00	
Blue light, small	B(λ)	W.m ⁻²	E _B	-	-	-	-	-	-	
Retinal	R(λ)	W.m ⁻²	L _R	2.80e+05	0.00e+00	2.80e+05	3.63e+05	7.10e+05	0.00e+00	
Retinal thermal, Weak visual stimulus	R(λ)	W.m ⁻² .sr ⁻¹	L _{IR}	7.00e+04	0.00e+00	6.00e+04	0.00e+00	6.00e+04	0.00e+00	
IR radiation		W.m ⁻²	E _{IR}	100.0	0.00e+00	570.0	0.00e+00	3200.0	0.00e+00	

* Small source defined as one with α < 0,011 radian. Averaging field of view at 10000 s is 0,1 radian.
 ** Involves evaluation of non-GLS source

Appendix A EUT photos
Photo1 General appearance of EUT

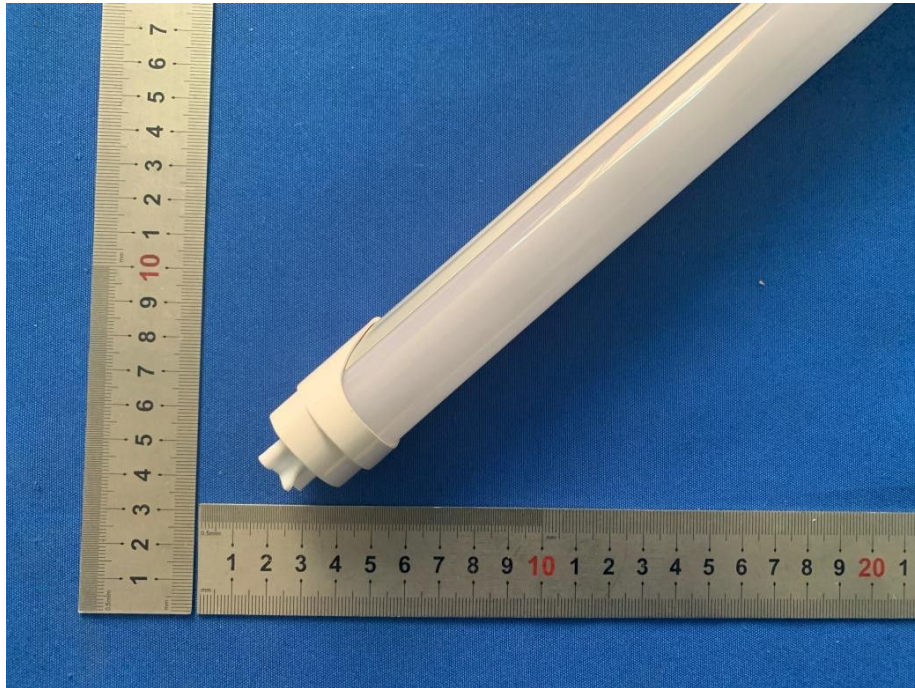
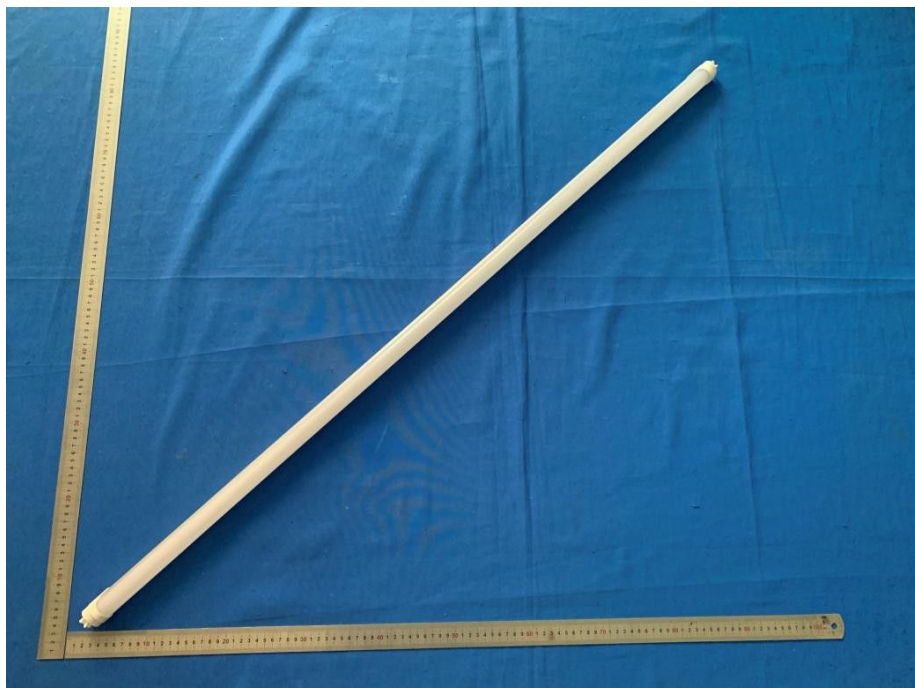


Photo2 General appearance of EUT



End of the report