

TEST REPORT IEC/EN 62560 Self-Ballasted LED-Lamp for general lighting services by voltage > 50V Safety specifications EN 62471 Photobiological safety of lamps and lamp systems - Part 5: Image projectors EN 62493 Assessment of lighting equipment related to human exposure to electromagnetic fields	
Report Number	17ZCTS113006LR
Date of issue.....	2017-11-30
Total number of pages.....	30 pages
Applicant's name	LIGHTAC INDUSTRY CO., LIMITED
Address.....	NO.8, TANGFANG,TONGZHOU,NANTONG CITY, JIANGSU,CHINA.
Test specification:	
Standard.....	EN 62560:2012+AC:2015 EN 62471:2008 EN 62493:2015
Test procedure.....	CE-LVD
Non-standard test method.....:	N/A
Test Report Form No	IEC62560A
Test Report Form(s) Originator....	DEKRA Certification B.V.
Master TRF.....	Dated 2016-04
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Test item description	LED BULB
Trade Mark.....	N/A
Manufacturer.....	LIGHTAC INDUSTRY CO., LIMITED
Address.....	NO.8, TANGFANG,TONGZHOU,NANTONG CITY, JIANGSU,CHINA.
Model/Type reference.....	LT-HYD7W
Ratings.....	Input: 100-265V~ 50/60Hz 7W

Testing procedure and testing location:		
<input checked="" type="checkbox"/>	Testing Laboratory:	Shanghai EU Test Technology Co., Ltd.
Testing location/ address..... :		B-4-11 ZHANGJIANG HIGH-TECH PARK Pudong Xinqu, Shanghai, China
<input type="checkbox"/>	Associated CB Laboratory:	
Testing location/ address..... :		
Tested by (name + signature)..... :		Teresa Wu
Approved by (name + signature)..... :		Tomy Wu
<input type="checkbox"/>	Testing procedure: TMP	N/A
Testing location/ address..... :		
Tested by (name + signature)..... :		
Approved by (name + signature)..... :		
<input type="checkbox"/>	Testing procedure: WMT	N/A
Testing location/ address..... :		
Tested by (name + signature)..... :		
Witnessed by (name + signature)..... :		
Approved by (name + signature)..... :		
<input type="checkbox"/>	Testing procedure: SMT	N/A
Testing location/ address..... :		
Tested by (name + signature)..... :		
Approved by (name + signature)..... :		
Supervised by (name + signature)..... :		
<input type="checkbox"/>	Testing procedure: RMT	N/A
Testing location/ address..... :		
Tested by (name + signature)..... :		
Approved by (name + signature)..... :		
Supervised by (name + signature)..... :		

List of Attachments (including a total number of pages in each attachment):

1, Photo document. (1 pages)

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

1, The LED Flame Bulb passed clauses test according to standard EN 62560:2012+AC:2015 as below:

Clause 5: Marking

Clause 6: Interchangeability

Clause 7: Protection against accidental contact with live parts

Clause 8: Insulation resistance and electric strength after humidity treatment

Clause 9: Mechanical strength

Clause 10: Cap temperature rise

Clause 11: Resistance to heat

Clause 12: Resistance to flame and ignition

Clause 13: Fault conditions

Clause 14: Creepage distances and clearances

Clause 15: Abnormal operation

Clause 16: Test conditions for dimmable lamps

Clause 17: Photobiological safety

Clause 18: Ingress protection

Clause 19: Information for luminaire design

Testing location:

**B-4-11 ZHANGJIANG HIGH-TECH PARK
Pudong Xinqu, Shanghai, China**

Summary of compliance with National Differences**No national difference.**

The product fulfils the requirements of IEC 62560:2011+A1:2015 and EN 62560:2012+AC:2015.

Copy of marking plate

LED BULB



Model: LT-HYD7W

Input: 100-265V~ 50/60Hz7W;



LIGHTAC INDUSTRY CO., LIMITED
Made in China

Test item particulars	: LED BULB
Classification of installation and use.....	: Self-ballasted LED-lamp and for normal use
Supply Connection.....	: E27
.....	
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.....	: 2017-11-16
Date (s) of performance of tests.....	: 2017-11-16 to 2017-11-30
General remarks:	
<p>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. Clause numbers between brackets refer to clauses in EN 62560:2012+AC:2015</p> <p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator. Determination of the test result includes consideration of measurement uncertainty from the test equipment and methods.</p>	
Manufacturer's Declaration per sub-clause 6.2.5 of IEC62560:	
<p>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..... :</p> <p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable</p>	
When differences exist; they shall be identified in the General product information section.	
<p>Name and address of factory (ies)..... : LIGHTAC INDUSTRY CO., LIMITED NO.8, TANGFANG,TONGZHOU,NANTONG CITY, JIANGSU,CHINA.</p>	
General product information:	
<p>1. The equipment with models LT-HYD7W, LT-HYD3W,LT-HYD4W,LT-HYD5W are LED BULB. 2. The series products have the same circuit diagram, PCB layout and functionality. The differences are the model name, so, we select LT-HYD7W to test.</p>	

EN 62560			
Clause	Requirement + Test	Result - Remark	Verdict
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).....: 100-265V~		P
	- rated wattage (W).....: 7W		P
	- rated frequency (Hz).....: 50/60Hz		P
5.2	Addition marking		P
	- rated current (A).....:		N/A
	- weight significantly higher		P
	- special conditions or restrictions		P
	Not suitable for dimming; symbol used 		P
	-Not suitable for water contact, symbol used  or provide cautionary notice " Use in Dry Locations only".		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 and mass imparted by the lamp at the lamp holder		P
	Bending moment and mass (not exceed in Table2)		P
	Not in Table2, specified in IEC 60061-1.		N
	The pivot line. Shall lie at the bottom end of the cylindrical part (for Edison and bayonet caps) or at the end of the contact pins (for pin caps).		P

EN 62560			
Clause	Requirement + Test	Result - Remark	Verdict
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 (M Ω):		P
	≥ 4 M Ω for double or reinforced insulation.....: >4 M Ω		P
8.3	Immediately after clause 8.2 electric strength test for 1 min		P
	Double or reinforced insulation, 4U + 2000 V	3060	P
	No flashover or breakdown		P

9	MECHANICAL STRENGTH		
9.1	Mechanical strength (test as given in 9.2)		P
9.2	Torsion resistance of unused lamps		P
	Torque test		N/A
	B 15 d Cap..... 1,15 Nm		N/A
	B 22 d Cap..... 3,0 Nm		N/A
	E 11 Cap..... 0,8 Nm		N/A
	E 12 Cap..... 0,8 Nm		N/A
	E 14 Cap..... 1,15 Nm		N/A
	E 17 Cap..... 1,5 Nm		N/A
	E 26, E26d or E27 Cap..... 3,0 Nm	E27	P
	E 39 or E40 Cap..... 5 Nm		N/A
	GU10 Cap..... u.c.		N/A
	GZ10 Cap..... u.c.		N/A
	GX 53 Cap..... 3,0 Nm		N/A
9.2.2	Torsion resistance of lamps after a defined time of usage		P
	Torsion resistance of used lamp	under consideration.	P
9.2.3	Externally applied axial pull and bending moment		P
	Lamp construction		P
	Material closest to the cap.		P

EN 62560			
Clause	Requirement + Test	Result - Remark	Verdict
	Mating plane with the lamp holder.		P
	Pulling force and bending moment (from 0 to the specified value).		P
9.3	Compliance criteria		P
	Clause 8 shall comply after the mechanical strength test.		P
9.4	Axial strength of Edison caps		P
	Central contact. (See figure 7)		P
	Unmounted cap		P
	Intact		P
10	CAP TEMPERATURE RISE		
	The cap temperature rise Δt_s of the lamp shall not exceed 120 K.	E27: 60.3K	P
11	RESISTANCE TO HEAT		P
	Parts of insulating material retaining live parts in position, ball-pressure test:		P
	- part; test temperature (°C)	Enclosure: 75°C, 0.55mm	P
	- part; test temperature (°C)		N/A
	- part; test temperature (°C)		N/A
	- part; test temperature (°C)		N/A
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	Test conditions		N/A
	Only one component at a time is subjected to a fault conditions as following		P
	where diagram indicates fault condition impairs safety	(see appended table)	P
	Examination of the lamp and its circuit diagram		P
	Components or devices in which a short-circuit does not occur shall not be bridged.		P

EN 62560			
Clause	Requirement + Test	Result - Remark	Verdict
	Components or devices in which an open circuit can not occur shall not be interrupted.		P
	Component dose not impair safety		P
	Test voltage between 90% and 110% of the rated voltage(sample free burning) .		P
	Most critical test voltage between 90% and 110%(declared voltage range).		P
13.3	Compliance		P
	Sample free burning		P
	Sample test for a further 8 h, no fire during the test .		P
	Or Flammable gases and live parts not accessible		N
	Accessible parts become live(test by clause 7)		P
	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		N/A
15	Abnormal operation		P
	Self-ballasted lamps shall not create hazard		P
	Protection against electric shock		P
	Applying Non-dimmable self-ballasted lamps on a dimmer or an electronic switch is to be tested as a possible case of abnormal operation.		P
	Test non-dimmable lamp in test circuit shown in Figure 8		P
	R1 and S1 setting (Max $I_{r.m.s}$ occurs)		N
	Test at this situation, and if the lamp passively fails within 60 min, repeat the test at 10% lower $I_{r.m.s}$. The lower $I_{r.m.s}$ shall be set in the decreasing potentiometer resistance direction.		P
	Repeat this procedure until stable operation is achieved for minimum 60 Min.		P
16	Test conditions for dimmable lamps		N
	Max power setting for Clause 10 and Clause 17		N

EN 62560			
Clause	Requirement + Test	Result - Remark	Verdict
	Under consideration (Clause 13)		N
17	Photobiological safety		P
17.1	UV radiation		N
	Ultraviolet hazard (not exceed 2mW/klm)		N
17.2	Blue light hazard		P
	Blue light hazard(according to IEC TR 62778)		P
17.3	Infrared radiation		N
	Marking or other safety measurements		N
18	Ingress protection		N
18.2	Water contact (IPX4 test according to IEC 60598-1)		N
19	Information for luminaire design(See annex A applies)		P

13	TABLE: tests of fault conditions		P
Part	Simulated fault	Result	Hazard
Output	Short-circuit;	The output shut down, No broken	NO

11	TABLE: Ball Pressure Test of Thermoplastics		P
Allowed impression diameter (mm)		2mm	—
Part	Test temperature (°C)	Impression diameter (mm)	
Enclosure	75°C	0.55mm	
Supplementary information: None			

14(16)	TABLE: Clearance And Creep age Distance Measurements					P
clearance cl and creep age distance decay at/of:	Up (V)	U rams. (V)	Required cl (mm)	cl (mm)	required decay (mm)	decay (mm)
Between L and N of PCB:	-	265V	1.7mm	>1.7mm	2.5mm	>2.5mm
Between live parts and accessible surface	-	265V	3mm	>3mm	5mm	>5mm
Supplementary information: None						

TABLE: Critical components information					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾
PCB	SHANDONG JINBAO ELECTRONICS CO., LTD.	CEM-1	V-0, 130°C	UL	UL E141940 and tested with appliance
LED	San'an Optoelectronics CO., LTD.	2835	0.7W	--	--
E27 lamp holder	Zhongshan smile Lighting Co., Ltd.	E27	Iron nickel plating, 100°C	--	--
Enclosure	SABIC INNOVATIVE PLASTICS US L L C	943X(GG)(X)	V-0, 120°C	/	UL E121562 and tested with appliance

EN / IEC 62471			
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 $10^4 \text{ cd}\cdot\text{m}^{-2}$		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 $30 \text{ J}\cdot\text{m}^{-2}$ within any 8-hour period		P
	To protect against injury of the eye or skin from ultraviolet radiation exposure produced by a broadband source, the effective integrated spectral irradiance, E_s , of the light source shall not exceed the levels defined by:		P
	$E_s \cdot t = \sum_{200}^{400} \sum_t E_\lambda(\lambda, t) \cdot S_{UV}(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 30 \quad \text{J}\cdot\text{m}^{-2}$		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		P
	$t_{\max} = \frac{30}{E_s} \quad \text{s}$		P
4.3.2	Near-UV hazard exposure limit for eye		P
	For the spectral region 315 nm to 400 nm (UV-A) the total radiant exposure to the eye shall not exceed $10000 \text{ J}\cdot\text{m}^{-2}$ 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 $10 \text{ W}\cdot\text{m}^{-2}$.		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s, shall be computed by:		P
	$t_{\max} \leq \frac{10\,000}{E_{UVA}} \quad \text{s}$		P
4.3.3	Retinal blue light hazard exposure limit		P
	To protect against retinal photochemical injury from chronic blue-light exposure, the integrated spectral radiance of the light source weighted against the blue-light hazard function, $B(\lambda)$, i.e., the blue-light weighted radiance, L_B , shall not exceed the levels defined by:		P
	$L_B \cdot t = \sum_{300}^{700} \sum_t L_\lambda(\lambda, t) \cdot B(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 10^6 \quad \text{J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	fort $\leq 10^4 \text{ s}$	N/A
	$L_B = \sum_{300}^{700} L_\lambda \cdot B(\lambda) \cdot \Delta \lambda \leq 100 \quad \text{W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	fort $> 10^4 \text{ s}$	P
4.3.4	Retinal blue light hazard exposure limit - small source		N/A

EN / IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	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/A
	$E_B \cdot t = \sum_{300}^{700} \sum_t E_{\lambda}(\lambda, t) \cdot B(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 100 \quad \text{J} \cdot \text{m}^{-2}$		N/A
	$E_B = \sum_{300}^{700} E_{\lambda} \cdot B(\lambda) \cdot \Delta \lambda \leq 1 \quad \text{W} \cdot \text{m}^{-2}$		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
	$L_R = \sum_{380}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta \lambda \leq \frac{50\,000}{\alpha \cdot t^{0,25}} \quad \text{W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	(10 $\mu\text{s} \leq t \leq 10 \text{ s}$)	P
4.3.6	Retinal thermal hazard exposure limit – weak visual stimulus		P
	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:		P
	$L_{IR} = \sum_{780}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta \lambda \leq \frac{6\,000}{\alpha} \quad \text{W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	$t > 10 \text{ s}$	P
4.3.7	Infrared radiation hazard exposure limits for the eye		P
	The avoid thermal injury of the cornea and possible delayed effects upon the lens of the eye (cataractogenesis), ocular exposure to infrared radiation, E_{IR} , over the wavelength range 780 nm to 3000 nm, for times less than 1000 s, shall not exceed:		P
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta \lambda \leq 18\,000 \cdot t^{-0,75} \quad \text{W} \cdot \text{m}^{-2}$	$t \leq 1000 \text{ s}$	P
	For times greater than 1000 s the limit becomes:		P
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta \lambda \leq 100 \quad \text{W} \cdot \text{m}^{-2}$	$t > 1000 \text{ s}$	P
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
	$E_H \cdot t = \sum_{380}^{3000} \sum_t E_{\lambda}(\lambda, t) \cdot \Delta t \cdot \Delta \lambda \leq 20\,000 \cdot t^{0,25} \quad \text{J} \cdot \text{m}^{-2}$		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)		N/A
	Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.		N/A

EN / IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
5.1.2	Test environment		P
	For specific test conditions, see the appropriate IEC lamp standard or in absence of such standards, the appropriate national standards or manufacturer's recommendations.	Temperature maintained at 25±1°C, Relative humidity shall be maintained to less than 65%; Airflow shall be minimized when measuring	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		N/A
	Operation of the test lamp shall be provided in accordance with:		N/A
	– the appropriate IEC lamp standard, or		N/A
	– the manufacturer's recommendation		N/A
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		P
	The determination of α , the angle subtended by a source, requires the determination of the 50% emission points of the source.		P
5.2.4	Pulse width measurement for pulsed sources	Continuous wave lamps	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.		P

EN / IEC 62471			
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.		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	At a distance which produces an illuminance of 500 lux	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	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 (E_S) within 8-hours exposure (30000 s), nor		P
	– a near-UV hazard (E_{UVA}) within 1000 s, (about 16 min), nor		P
	– a retinal blue-light hazard (L_B) within 10000 s (about 2,8 h), nor		P
	– a retinal thermal hazard (L_R) within 10 s, nor		P
	– an infrared radiation hazard for the eye (E_{IR}) within 1000 s		P
6.1.2	Risk Group 1 (Low-Risk)		N/A
	In this group are lamps, which exceeds the limits for the exempt group but that does not pose:		N/A
	– an actinic ultraviolet hazard (E_S) within 10000 s, nor		N/A
	– a near ultraviolet hazard (E_{UVA}) within 300 s, nor		N/A
	– a retinal blue-light hazard (L_B) within 100 s, nor		N/A
	– a retinal thermal hazard (L_R) within 10 s, nor		N/A
	– an infrared radiation hazard for the eye (E_{IR}) within 100 s		N/A
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 100 s are in Risk Group 1.		N/A
6.1.3	Risk Group 2 (Moderate-Risk)		N/A
	This requirement is met by any lamp that exceeds the limits for Risk Group 1, but that does not pose:		N/A
	– an actinic ultraviolet hazard (E_S) within 1000 s exposure, nor		N/A
	– a near ultraviolet hazard (E_{UVA}) within 100 s, nor		N/A
	– a retinal blue-light hazard (L_B) within 0,25 s (aversion response), nor		N/A

EN / IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	– 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_R), 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.	Continuous wave lamps	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
	– 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		--
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	
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	--
Wavelength nm	Blue-light hazard function B (λ)	Burn hazard function R (λ)	
300	0,01		
305	0,01		
310	0,01		
315	0,01		
320	0,01		
325	0,01		
330	0,01		
335	0,01		
340	0,01		
345	0,01		
350	0,01		
355	0,01		
360	0,01		
365	0,01		
370	0,01		
375	0,01		
380	0,01	0,1	
385	0,013	0,13	
390	0,025	0,25	
395	0,05	0,5	
400	0,10	1,0	
405	0,20	2,0	
410	0,40	4,0	
415	0,80	8,0	
420	0,90	9,0	
425	0,95	9,5	
430	0,98	9,8	
435	1,00	10,0	
440	1,00	10,0	
445	0,97	9,7	
450	0,94	9,4	
455	0,90	9,0	
460	0,80	8,0	
465	0,70	7,0	
470	0,62	6,2	
475	0,55	5,5	
480	0,45	4,5	
485	0,40	4,0	
490	0,22	2,2	
495	0,16	1,6	
500-600	$10^{[(450-\lambda)/50]}$	1,0	
600-700	0,001	1,0	
700-1050		$10^{[(700-\lambda)/500]}$	
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)					--
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)					--
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/α

Table 6.1 Emission limits for risk groups of continuous wave lamps(Base on IEC62471:2006)									N/A
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	--	4000000	--
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	1,0*	--	1,0	--	400	--
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	$28000/\alpha$	--	$28000/\alpha$	--	$71000/\alpha$	--
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	--

Remark:
Angular subtense of apparent source, $\alpha = \text{mrad}$
* Small source defined as one with $0 < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian.
** Involves evaluation of non-GLS source

EN 62493: 2010

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1. Test Summary

EMISSION			
Test Item	Test Standard	Class / Severity	Result
Mains Terminal Disturbance Voltage, 20kHz to 30MHz	EN 62493:2010	Clause 4.3.1 of CISPR15	Pass
Radiated electromagnetic disturbance, 100kHz to 30MHz	EN 62493:2010	Clause 4.4 of CISPR15	Pass
Radiated Emission, 30MHz to 300MHz	EN 62493:2010	Table B.1 of CISPR15	Pass
Current Density Test, 20kHz to 10MHz	EN 62493:2010	Annex D of EN 62493	Pass

Remark:

Pass	Test item meets the requirement
Fail	Test item does not meet the requirement
N/A	Test case does not apply to the test object

2. TABLE OF CONTENT

No .	Item	Remarks
1	Test Summary	
2	Contents	
3	General Information	
3.1	General Description of E.U.T	
3.2	Details of E.U.T	
3.3	Description of Support Units	
3.4	Standards Applicable for Testing	
3.5	Test Facility	
3.6	Subcontracted	
3.7	Abnormalities from Standard Conditions	
4	Equipment Used during Test	
4.1	Measurement Uncertainty	
5.	Emission Test Results	
5.1	Mains Terminals Disturbance Voltage, 20kHz to 30MHz	
5.1.1	E.U.T. Operation	
5.1.2	Block Diagram of Test Setup	
5.1.3	Measurement Data	
5.2	Radiated Electromagnetic Disturbance, 100kHz to 30MHz	
5.2.1	E.U.T. Operation	
5.2.2	Block Diagram of Test Setup	
5.2.3	Measurement Data	
5.3	Radiated Emission, 30MHz to 300MHz	
5.3.1	E.U.T. Operation	
5.3.2	Block Diagram of Test Setup	
5.3.3	Measurement Data	
5.4	Current Density Test, 20kHz to 10MHz	
5.4.1	E.U.T. Operation	
5.4.2	Block Diagram of Test Setup	
5.4.3	Measurement Data	
5.4.4	Current Density Test Result	

3. General Information

3.1 General Description of E.U.T.

Product Name..... : LED BULB

Model No...... : LT-HYD7W, LT-HYD3W,LT-HYD4W,LT-HYD5W

Remark..... : All models in each series have same diagram circuit, PCB layout, except different model names and power. for trading purpose.

3.2 Details of E.U.T.

Technical Data..... : Input: 100-265V~, 50/60Hz, 7W

3.3 Description of Support Units

The EUT has been tested as an independent unit. LT-HYD7W is the test sample. All tests were performed in the condition of AC265/50Hz input.

3.4 Standards Applicable for Testing

The tests were performed according to following standards:

EN 62493:2010

Assessment of lighting equipment related to human exposure to electromagnetic fields.

3.5 Test Facility

The test facility has a test site registered with the following organizations:

IC – Registration No.:

FCC – Registration No.:

3.6 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

Yes No

If Yes, list the related test items and lab information:

Test items: ---

Lab information: ---

Abnormalities from Standard Conditions

None.

4. Equipment Used during Test

Conducted Emission					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	EMI Test Receiver	R&S	ESCI	101178	Valid
2.	LISN	R&S	ENV216	101215	Valid
3.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Valid
4.	Cable	HUBER+SUHNER	CBL2-NN-3M	2230300	Valid
5.	Switch	ESE	RSU/M2	---	Valid
Radiated Electromagnetic Disturbance					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	EMI Test Receiver	R&S	ESCI	101178	Valid
2.	Three Loops Antenna	SCHWARZBECK	HXYZ9170	213	Valid
CDN method for Lighting Equipments' Radiated Disturbance					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	EMI Test Receiver	R&S	ESCI	101178	Valid
2.	CDN	TESEQ	M016	31586	Valid
3.	Cable	HUBER+SUHNER	CBL2-NN-3M	2230300	Valid
Current Density Test					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	EMI Test Receiver	R&S	ESCI	101178	Valid
2.	Antenna	SCHWARZBECK	VDHH9502	9502-028	Valid

4.1 Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Mains Terminal Disturbance Voltage	150kHz~30MHz	±2.66dB	(1)
Radiated electromagnetic disturbance	9kHz to 30MHz	±3.00dB	(1)
Radiated Emission(CDN method)	30MHz~300MHz	±3.32dB	(1)
Current Density Test	20kHz to 10MHz	±1.84dB	(1)

5. Emission Test Results

Mains Terminals Disturbance Voltage, 20kHz to 30MHz

Test Requirement.....	: Clause 4.2 of EN 62493
Test Method.....	: CISPR15 Clause 8
Test Result.....	: Pass
Frequency Range.....	: 20kHz to 30MHz
Class/Severity.....	: Clause 4.3.1 of CISPR15

5.1.1 E.U.T. Operation

Operating Environment:

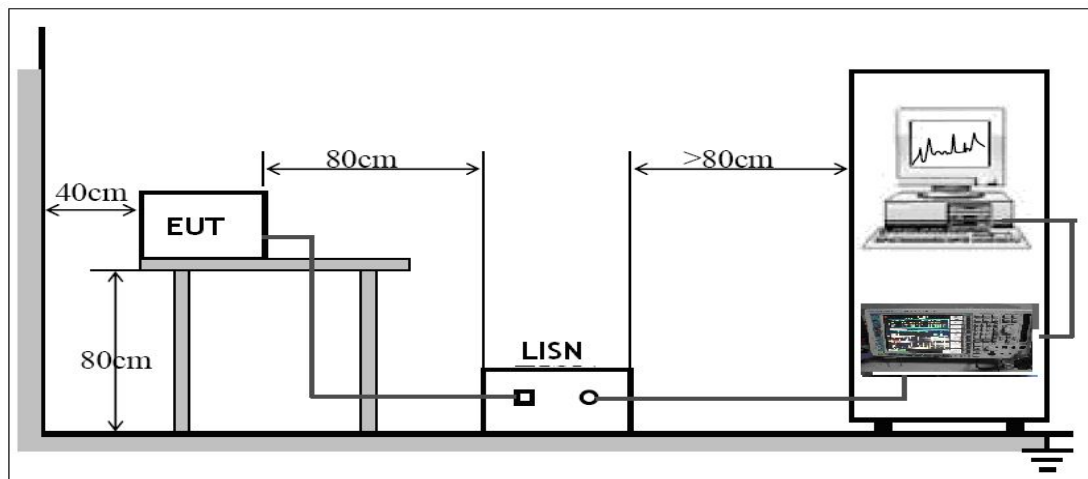
Temperature.....	: 25.3°C
Humidity.....	: 71%RH
Atmospheric Pressure.....	: 101kPa

EUT Operation:

Input Voltage.....	: 265/50Hz
Operating Mode.....	: <u>LT-HYD7W</u>

Block Diagram of Test Setup

The Mains Terminals Disturbance Voltage tests were performed in accordance with the CISPR15.



5.1.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

5.2 Radiated Electromagnetic Disturbance, 100kHz to 30MHz

Test Requirement.....	:	Clause 4.2 of EN 62493
Test Method.....	:	CISPR15 Clause 9.1
Test Result.....	:	Pass
Frequency Range.....	:	100kHz to 30MHz
Class/Severity.....	:	Clause 4.4 of CISPR15

E.U.T. Operation

Operating Environment:

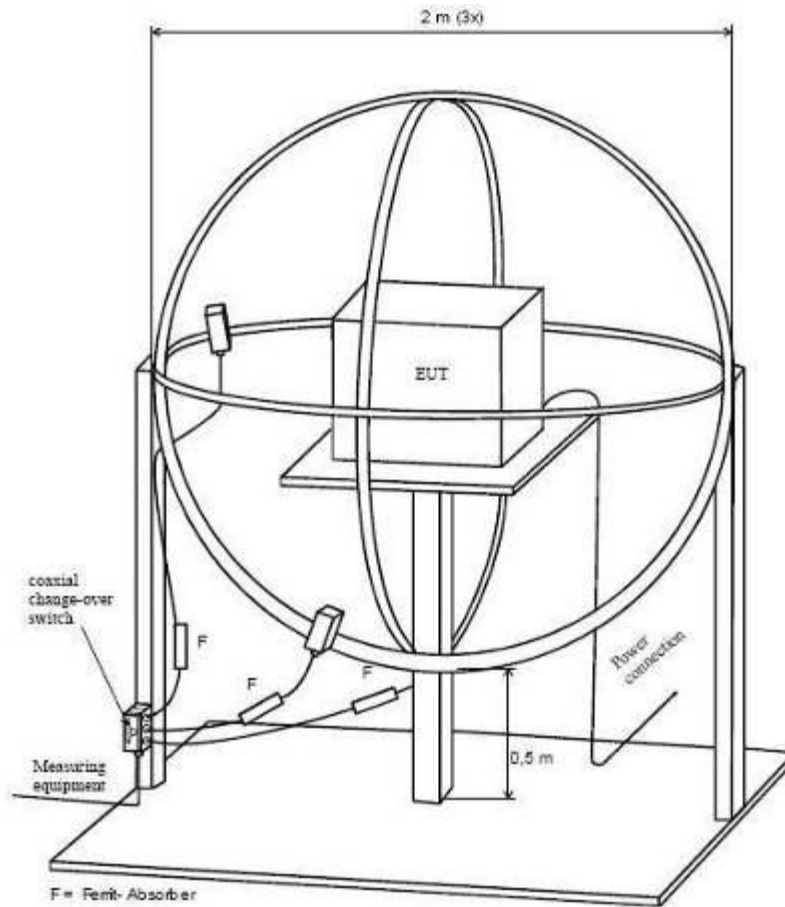
Temperature.....	:	25.3°C
Humidity.....	:	71%RH
Barometric Pressure.....	:	101kPa

EUT Operation:

Input Voltage.....	:	265/50Hz
Operating Mode.....	:	<u>LT-HYD7W</u>

5.2.2 Block Diagram of Test Setup

The Radiated Electromagnetic Disturbance (100kHz to 30MHz) test was performed in accordance with the CISPR15.



5.2.3 Measurement Data

According to the data in section 5.2.4, the EUT complied with the CISPR15 standards.

5.3 Radiated Emission, 30MHz to 300MHz

Test Requirement.....	: Clause 4.2 of EN 62493
Test Method.....	: CISPR15 Annex B
Test Result.....	: Pass
Frequency Range.....	: 30MHz to 300MHz
Class/Severity.....	: Table B.1 of CISPR15

5.3.1 E.U.T. Operation

Operating Environment:

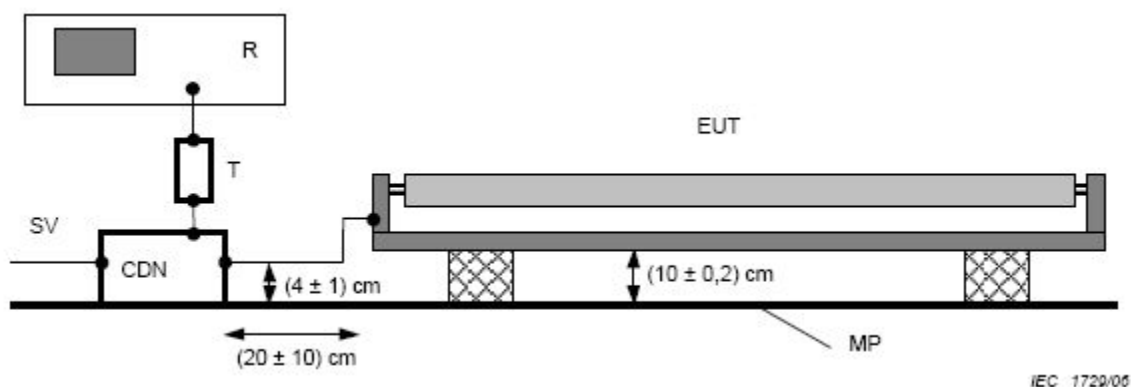
Temperature.....	: 25.3°C
Humidity.....	: 71%RH
Atmospheric Pressure.....	: 101kPa

EUT Operation :

Input Voltage.....	: 265/50Hz
Operating Mode.....	: <u>LT-HYD7W</u>

5.3.2 Block Diagram of Setup

The Radiated Emission test was performed in accordance with CISPR15 Annex B.



5.3.3 Measurement Data

If the lighting equipment complies with the requirements of this annex, it is deemed to comply with the radiated disturbances requirements in the frequency range 30 MHz to 300 MHz specified in 4.4.2 of this standard.

5.4 Current Density Test, 20kHz to 10MHz

Test Requirement.....	: Clause 4.2 of EN 62493
Test Method.....	: EN 62493 Annex D
Test Result.....	: Pass
Frequency Range.....	: 20kHz to 10MHz
Class/Severity.....	: Annex D of EN 62493

5.4.1 E.U.T. Operation

Operating Environment:

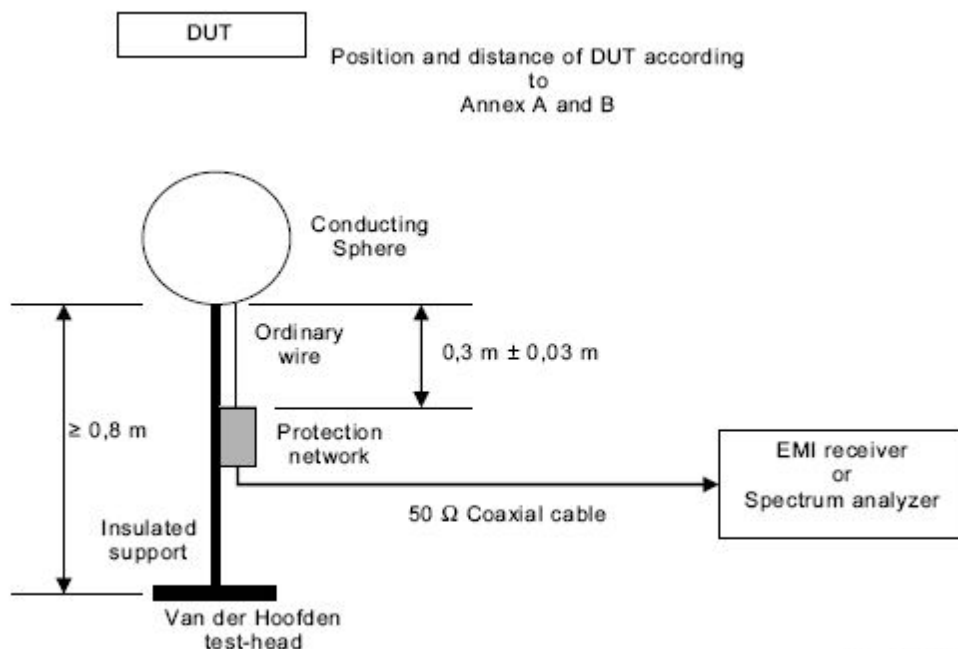
Temperature.....	: 25.3°C
Humidity.....	: 71%RH
Atmospheric Pressure.....	: 101kPa

EUT Operation:

Input Voltage.....	: 265/50Hz
Operating Mode.....	: <u>LT-HYD7W</u>
Measurement Distance.....	: 50cm

5.4.2 Block Diagram of Test Setup

The Current Density Test was performed in accordance with the EN 62493.



IEC 2333/09

5.4.3 Measurement Data

The measured (weighted and summarized) induced current density due to the electric field in the frequency range 20 kHz to 10 MHz does not exceed the factor (F) 0,85 as defined in Annex D.

5.4.4 Current Density Test Result

Frequency	Test Factor (F)	Factor limit	Result
20kHz~10MHz	0.042	0.85	Pass

Photos Documentations

Photo 1 General Appearance of LT-HYD7W



Photo 2 General Appearance of LT-HYD7W



=====**The End of Report**=====