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Report No.: 68.140.20.0090.01

## TEST REPORT IEC 62471-5 Photobiological safety of lamps and lamp systems – Part 5: Image projectors

Report Number	68.140.20.0090.01						
Date of issue	2020-05-20						
Total number of pages	14 (including attachments)						
Name of Testing Laboratory	TÜV SÜD Certification and Testing (China) Co., Ltd.						
preparing the Report	Shenzhen Branch						
Applicant's name: I	Espedeo Holdings Limited						
Address	√istra Corporate Services Centre, Wickhams Cay II, Road Town, √G1110, Tortola, BRITISH VIRGIN ISLANDS						
Test specification:							
Standard I	EC 62471-5 (First Edition)						
Test procedure	Type test						
Non-standard test method	N/A						
Test Report Form No	EC62471_5A						
Test Report Form(s) Originator: I	JL (US)						
Master TRF	Master TRF 2015-11						
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If this Test Report Form is used by non- Scheme procedure shall be removed.	IECEE members, the IECEE/IEC logo and the reference to the CB						
General disclaimer:							
The test results presented in this report r This report shall not be reproduced, exce Laboratory. The authenticity of this Test responsible for this Test Report.	elate only to the object tested. ept in full, without the written approval of the Issuing CB Testing Report and its contents can be verified by contacting the NCB,						
Test item description:	Laser Module						
Trade Mark:	<b>€</b> <b>E</b> spedeo Supra™						
Manufacturer:	GDC Technology Limited						
	Address: Unit 1-7, 20/F., Kodak House II, 39 Healthy Street East, North Point, HONG KONG						
Model/Type reference:	Supra-5000						

Input: 200-240VAC, 4-3A, 50/60Hz

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Ratings .....:



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Res	ponsible Testing Laboratory (as applical	ble), testing procedure	and testing location(s):			
	Testing Laboratory:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch				
Test	ing location/ address:	Building 12&13, Zhiheng Wisdomland Business Park Nantou Checkpoint Road 2, Nanshan District 518052 Shenzhen, CHINA				
	Associated CB Testing Laboratory:					
Test	ing location/ address:					
Test	ed by (name, function, signature):	Sky Feng	TESTING TO MANY			
Anni	oved by (name function signature)	Project Handler				
nppi	oved by (name, function, signature)	Jake Xu	AKEUNA			
		Designated Reviewer				
	Testing procedure: CTF Stage 1:					
Test	ing location/ address:					
Test	ed by (name, function, signature)					
Appr	oved by (name, function, signature):					
	Testing procedure: CTF Stage 2:					
Test	ng location/ address					
Test	ed by (name + signature):					
Witn	essed by (name, function, signature):					
Appr	oved by (name, function, signature):					
	Testing procedure: CTF Stage 3					
	Testing procedure: CTF Stage 4					
Testi	ng location/ address					
Test	ed by (name, function, signature):					
Witn	essed by (name, function, signature):					
Appr	oved by (name, function, signature):					
Supe	ervised by (name, function, signature):					

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each attachment): Iocation: 12&13, Zhiheng Wisdomland Business intou Checkpoint Road 2, Nanshan District Shenzhen CHINA
<b>Iocation:</b> 12&13, Zhiheng Wisdomland Business intou Checkpoint Road 2, Nanshan District Shenzhen CHINA
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2471-5:2015
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n marks on a product must be authorized by
Caution Do not stare into the beam Ne regardez pas dans le faisceau. RG2



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Test item particulars:	Digital Cinema and Secured Media Projection System
Supply Connection:	Supply cord with plug
Intended Application:	🗌 Data projector 🔲 Home-use projector
	☐ Cinema-use projector ☐ Other [ ]
Equipment Mobility:	Hand-held Transportable Movable
	Stationary Other [ ]
Emission Condition	Continuous Wave (CW) Emission
Lamp Type:	LED I lungsten-halogen
Projector Did/ Orour (DC)	$\square$ BC0 projector $\square$ BC1 projector
	$\square$ RG2 projector $\square$ RG3 projector
Possible test case verdicts:	
test case does not apply to the test object	N/A
test clase does not apply to the test object	
- test object does meet the requirement	r (rass)
l esting:	2020-03-25
Date of receipt of test item	2020-03-25
Date (s) of performance of tests	2020-03-25 to 2020-05-20
General remarks:	
"(See Enclosure #)" refers to additional information ar	prended to the report
"(See appended table)" refers to a table appended to th	ne report.
Throughout this report a $\Box$ comma / $\Box$ point is u	sed as the decimal senarator
	seu as the decimal separator.
Manufacturer's Declaration per sub-clause 4.2.5 of	IECEE 02:
The application for obtaining a CB Test Certificate	☐ Yes
includes more than one factory location and a	☑ Not applicable
sample(s) submitted for evaluation is (are)	
representative of the products from each factory has	
vvnen differences exist; they shall be identified in t	ne General product information section.
Name and address of factory (ies):	GDC Technology Limited
	Unit 1-7, 20/F., Kodak House II, 39 Healthy Street
	Easi, North Point, HUNG KUNG



## General product information:

The product name is Digital Cinema and Secured Media Projection System.

This product is considered to be a professional product that can be installed and operated only in controlled conditions.

This projector models are installed by skilled personnel (service personnel).

These models can also be installed by skilled personnel in residential environments taking into account the provided installation instructions.

## The used Laser diode specification as below:

Laser Model no.	Manufacturer	Vf (V)	I⊧(A)	Optical Power(W)	Color	Wavelength (nm)
NUBM35	NICHIA CORPORATION	DC 52-62	3.5	67	Blue	449-461
NUGM03	NICHIA CORPORATION	DC 32-43	2.0	8.5	Green	520-530
ML562G85-03	Mitsubishi Electric Corporation	DC 2.0-2.4	2.25	2.1	Red	635-642
HL63290HD	USHIO OPTO SEMICONDUCTO RS, INC	DC 2.4-2.8	2.4	2.2	Red	632-642



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Clause	Requirement + Test	Result - Remark	Verdict			
4	GENERAL					
4.4	Assessment criteria – assigned risk group of projector		Р			

5	<b>RISK GROUP DETERMINATION</b>				
5.1	Test conditions		Р		
	- climatic conditions	Dark room and 25.0°C	Р		
	- vibration and shock	Non vibration and shock	Р		
	Evaluation with product adjusted to maximum emissions and light source operated at maximum optical power output.	Product under Max. output optical power mode and adjusted the maximum throw ratio.	Ρ		
	Evaluation under reasonably foreseeable single fault		Р		
5.2	Measurement conditions for image projector				
5.2.1	Measurement throw ratio:	2.70 (Projection width 0.55m)	Р		
5.2.2	Measurement distance (1 m from the closest point of human access):	1 m (Between the lens of projector and screen)	Р		
5.3	The position and size of apparent source, the calculation of angular subtense		Р		
	Angular subtense of apparent source:	0.034mrad.			
5.4	Measurement of irradiance – specified apertures		Р		
	Angle of acceptance:	0.011 rad			
	Aperture stop diameter:	20 mm	—		
5.5	Measurement of radiance		Р		
	Field of view for CW emission (Table 1) :	0.011rad, 0.11rad and 1.4rad	Р		
	Field of view for pulsed emission (Table 2):		N/A		
5.6	Accessible emission limits		Р		
5.6.1	For CW emission	(See appended table 3)	Р		
5.6.2	For pulsed emission	Not applicable	N/A		
5.6.2.1	Emission considered pulsed due to peak radiated power over 1.5 times average radiated power.		N/A		
5.6.2.2	For UV, UVA, photochemical retinal limits and IR cornea limit	(See appended table 3)	N/A		
5.6.2.3	For retinal thermal limit		N/A		
	a) Averaged radiance		N/A		
	(a-1) Regular pulse pattern	(See appended table 5)	N/A		
	(a-2) Irregular pulse pattern	(See appended table 5)	N/A		



	IEC 62471-5		
Clause	Requirement + Test	Result - Remark	Verdict
	b) Peak radiance		N/A
	Number of pulses N and factor C <sub>5</sub> (Table 6) :		N/A
5.6.3	Spectral weighting functions		Р
5.7	Applying information from the lamp manufacturers		Р
5.7.1	General		Р
5.7.2	Limits provided in irradiance/radiant exposure		Р
5.7.3	Limits provided in radiance or radiance dose		Р
6	MANUFACTURER'S REQUIREMENTS		_
6.1	General		Р
6.2	Determination of HD (hazard distance)		N/A
6.3	Safety feature "soft start"		Р
6.4	Optional safety features		N/A
6.4.1	Projection of warning message		N/A
6.4.2	Power reduction by sensor system		N/A
6.5	Labelling on products		Р
6.5.1	General		Р
	Labels durable, permanently affixed, legible, and clearly visible		Р
	Labels positioned so that they can be read without exposure to radiation in excess of applicable AEL		Р
	Label and symbol size adapted to product size		Р
	Colour combination of text, borders and background		Р
	Labels required by IEC 60825-1 for laser illuminated projectors		Р
6.5.2	RG0 projector		N/A
6.5.3	RG1 projector		N/A
	RG1 label (Figure 5):		N/A
6.5.4	RG2 projector		Р
	RG2 label (Figure 6):	See "Copy of marking plate"	Р
	RG2 caution symbol (Figure 7):		N/A
	RG2 caution pictogram (Figure 8):		N/A
6.5.5	RG3 projector		N/A
	RG3 label (Figure 9):		N/A
	Optical radiation warning symbol (Figure 10):		N/A
	Not for household use symbol (Figure 11): :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.6	User information		Р
6.6.1	General		Р
6.6.2	Assessment of user accessible area		N/A
6.6.3	User information (user manual)		Р
6.6.3.1	General		Р
	Reproduction of all required labels		Р
6.6.3.2	RG0 projector		N/A
6.6.3.3	RG1 projector – wording used:		N/A
6.6.3.4	RG2 projector – wording used:	On the user manual	Р
6.6.3.5	RG3 projector – wording used:		N/A
	Hazard distance:		N/A
6.6.4	User information for maintenance		Р
6.7	Labelling and user information for image projectors where the risk group will be changed by interchangeable lens		Р
6.7.1	General		N/A
6.7.2	Labelling on the projector		N/A
	Wording provided for projectors becoming RG3 when an interchangeable lens with higher throw ratio is used:		_
6.7.3	Mark on the interchangeable lens		N/A
6.7.4	The user information in the user manual of the projector		N/A
	Explanation of the change of hazard magnitude by installing interchangeable lenses		N/A
	List of model numbers of interchangeable lenses		N/A
	Hazard distance at the maximum TR of each lenses		N/A
6.7.5	The user information in the user manual of the interchangeable lens		N/A
	Explanation of the change of hazard by installing the lens		N/A
	Throw ratio range of the lens		N/A
	List of model numbers of projectors with which the lens may be used		N/A
	Hazard distance according to the highest TR		N/A

7	INFORMATION FOR SERVICE	
	Adequate instructions for service personnel	Р

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Clause	Requirement + Test	Result - Remark	Verdict		

Table 3       AEL (accessible emission limits) for risk groups of lamps and lamp systems emitting CW optical radiation							P			
		Symbol	Emission Measurement							
Hazard	Wavelength range, nm	for emission	Exemp (R	t Group G0)	Risk G (RC	iroup 1 G1)	Risk G (RC	roup 2 32)	Units	Assigned Risk Group
		level <sup>1</sup>	Limit	Result	Limit	Result	Limit	Result		
UV <sup>2</sup>	200 to 400	Es	0,001	0.000209	0,003		0.03		W∙m⁻²	RG0
UV-A <sup>2</sup>	315 to 400	Euva	10	0.000323	33		100		W•m⁻²	RG0
Blue-light	300 to 700	LB	100	709	10 000	166000	4 000 000	166000	W•m⁻²•sr⁻¹	RG2
Blue-light smal	300 to 700	E	1.0		1.0		400		₩•m <sup>-2</sup>	RGO
source	300 10 700	LB	1,0		1,0		400		VV -111	ROU
Retinal thermal	380 to 1400	L <sub>R</sub>	28 000/α	683000	28 000/α		28 000/α		W•m <sup>-2</sup> •sr <sup>-1</sup>	RG0
IR anterior eye	<sup>2</sup> 780 to 3000	EIR	100	0.0592	570		3200		W∙m⁻²	RG0
Supplementary	Supplementary information:									

Symbols for emission levels (Es, E<sub>UVA</sub>, L<sub>B</sub>, E<sub>B</sub>, L<sub>R</sub>, E<sub>IR</sub>) and each formula are defined in IEC 62471. Some formulae of above emission levels are 1 defined by using weighting functions  $B(\lambda)$  and  $R(\lambda)$  (see Table 8). For an image projector that is to be assigned to RG2, the AE for UV, UVA and IR shall not exceed the AEL for RG2.

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Angular Subtense of Apparent Source  $\alpha$ : 0.034 rad.



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		-	-	
		IEC 62471-5		
Clause	Requirement + Test		Result - Remark	Verdict

Table 5	Basic ret	asic retinal thermal emission limit L <sub>R</sub>				
a) Average	d radiance	of pulse train			·	
Exposure duration *		α used for	Emission Measurement		Units	
		calculating AEL	Limit **	Result		
0,25 s			28000/α		W•m <sup>-2</sup> •sr <sup>-1</sup>	
					W•m <sup>-2</sup> •sr <sup>-1</sup>	
					W•m <sup>-2</sup> •sr <sup>-1</sup>	
b) Peak rac	liance of e	ach pulse				
Pulse du	ration ***	α used for	Emission Measurement		Units	

	calculating AEL		Units	
		Limit ****	Result	••••••
				W•m⁻²•sr⁻¹
				W∙m⁻²∙sr⁻¹
				W•m⁻²•sr⁻¹

## Assigned Risk Group

Supplementary information:

- \* For regularly pulse pattern, averaging exposure duration shall be 0,25 sec. For irregular pulse pattern, averaging exposure duration shall be 0,25 sec or shorter.
- \*\* The emission limit L<sub>R</sub> is defined as follows.  $L_R^{EL} = 0.63 \ \alpha^{-1} \cdot t^{-1} \text{ (for } t \le 1 \ \mu s), \ 2.0 \ x \ 10^4 \cdot \alpha^{-1} \cdot t^{-0.25} \text{ (for } 1 \ \mu s < t \le 0.25 \ s), \text{ same as CW (for > 0.25 \ s)}$
- \*\*\* The pulse duration is defined as  $t_p = D/L_{peak}$ .
- \*\*\*\* The limit value shall be multiplied by  $C_5$ .

Factor C5:



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Details of: Over view









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Details of: Internal view





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Details of: Internal view





Auachment Z. Equipment List								
Equipment ID	Equipment Name	Cal- Date	Due-Date	Maker	Model No.	Calibrate by		
68-1-18-16-039	Digital Caliper	2019-07-16	2020-07-15		111402 30	SMQ		
68-1-18-13-036	5M Steel measure tap	2018-06-26	2021-06-25	STANLEY	5.0M	SCM		
68-1-53-14-023	Digital Temperature and Humidity datalogger	2019-10-09	2020-10-08	SATO	SK- L200TH	SCM		
68-1-44-11-012	Double monochromator based spectroradiometer IDR300-4	2020-04-21	2021-04-22	BENTHAM	IDR300- 4	GZJLS		
68-1-34-08-010	6 <sub>1/2</sub> Digital Multimeter	2019-06-20	2020-06-19	Agilent	34401A	SMQ		
68-1-32-06-009	Power Meter	2019-10-09	2020-10-08	YOKOGAW	WT210	SMQ		

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Attachment 2: Equipment List

\*\*\*END OF REPORT\*\*\*

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