



TEST REPORT
IEC 60825-1
Safety of laser products -
Part 1: Equipment classification and requirements

Report Number..... : HK191112004-SR

Date of issue..... : 2019-11-13

Total number of pages 14 pages

**Name of Testing Laboratory
preparing the Report..... :** Shenzhen HUAKE Testing Technology Co., Ltd.

Applicant's name FLUX Technology Inc.

Address..... : 7F, No.459, Chongyang Rd., Nangang Dist., Taipei, Taiwan 115

Test specification:

Standard..... : IEC 60825-1:2014

Test procedure IEC test report

Non-standard test method N/A

Test Report Form No. : IEC60825_1F

Test Report Form(s) Originator : OVE

Master TRF..... : Dated 2019-10-14

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General disclaimer:

The test results presented in this report relate only to the object tested.

Test item description..... :	Beamo
Trade Mark..... :	N/A
Manufacturer	Same as applicant
Model/Type reference	FBM1
Ratings	Input: 100-127V~, 50/60Hz, 100W



Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒	Testing Laboratory:	Shenzhen HUAKE Testing Technology Co., Ltd.
Testing location/ address.....:		1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, China
☐	Associated Testing Laboratory:	
Testing location/ address.....:		
Tested by (name, function, signature).....:		Kevin Yao 
Approved by (name, function, signature)....:		Dendi Wei 
☐	Testing procedure: TMP/CTF Stage 1:	
Testing location/ address.....:		
Tested by (name, function, signature).....:		
Approved by (name, function, signature)....:		
☐	Testing procedure: WMT/CTF Stage 2:	
Testing location/ address.....:		
Tested by (name, function, signature).....:		
Witnessed by (name, function, signature) .:		
Approved by (name, function, signature)....:		
☐	Testing procedure: SMT/CTF Stage 3 or 4:	
Testing location/ address.....:		
Tested by (name, function, signature).....:		
Witnessed by (name, function, signature) .:		
Approved by (name, function, signature)....:		
Supervised by (name, function, signature) :		

TRF No. IEC60825_1F

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List of Attachments (including a total number of pages in each attachment): -Appendix 1: Photo document. (1 pages)	
Summary of testing:	
Tests performed (name of test and test clause): All clauses.	Testing location: Shenzhen HUAKE Testing Technology Co., Ltd. 1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, China
Summary of compliance with National Differences: N/A	
☒ The product fulfils the requirements of <u>IEC 60825-1:2014</u>	

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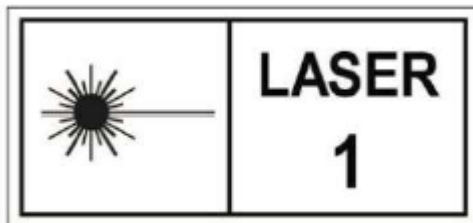
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Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



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Test item particulars.....: Beamo	
Classification of installation and use.....: Class I	
Supply Connection.....: Appliance inlet	
.....:	
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: 2019-11-08	
Date (s) of performance of tests: 2019-11-08 to 2019-11-12	
General remarks:	
"(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 ☐ comma / ☒ point is used as the decimal separator. Determination of the test result includes consideration of measurement uncertainty from the test equipment and methods. The related applicable CTL decisions have been considered and the requirements found fulfilled.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60825-1:	
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	☐ Yes ☒ Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies).....: Same as manufacturer	
General product information: N/A	

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IEC 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
4	CLASSIFICATION PRINCIPLES		
4.3	Classification rules		---
4.3 a	Radiation of a single wavelength		P
4.3 b	Radiation of multiple wavelengths	single wavelength	N/A
	1) Laser product emits at two or more wavelengths shown as additive in Table 1		N/A
	2) Laser product emits at two or more wavelengths not shown as additive in Table 1		N/A
4.3 c	Radiation from extended sources (see 5.4.3)		N/A
4.3 d	Non-uniform, non-circular or multiple apparent source		N/A
4.3 e	Time bases		---
	1) 0,25 s		P
	2) 100 s		N/A
	3) 30000 s		N/A
4.3 f	Repetitively pulsed or modulated lasers		N/A
	1) Any single pulse		N/A
	2) Average power for pulse trains		N/A
	3) Pulse duration $t \leq T_i$: Number of pulses N and C_5 :		N/A
	3) Pulse duration $t > T_i$: Number of pulses N and C_5 :		N/A
4.4	Laser products designed to function as conventional lamps.		N/A
	α measured at 200 mm distance from closest point of human access ($\alpha > 5$ mrad).		N/A
	Un-weighted radiance L measured at 200 mm distance (comparison with $L_T = 1 \text{ MWm}^{-2}\text{sr}^{-1}/\alpha$) under reasonably foreseeable single fault conditions.		N/A
	Evaluation of emission according to IEC 62471 series (optional): Standard applied (IEC 62471 series)..... : Risk Group..... : Labelling..... : Classification of product based on accessible laser radiation (if no laser radiation accessible: Class 1).		N/A
5	DETERMINATION OF THE ACCESSIBLE EMISSION LEVEL and PRODUCT CLASSIFICATION		

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IEC 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.1	Tests		---
	Compliance under reasonably foreseeable single fault conditions.		P
5.3	Determination of the class of the laser product ... : For Class 1C: vertical safety standard applied with requirements for Class 1C.		---
5.4	Measurement geometry		---
5.4.1	General		---
5.4.2	Default (simplified) evaluation		P
	Conditions applied	Condition 3	P
	Aperture diameter	11mm	P
	Reference point		P
	Measurement distance (for each condition)	0mm	P
5.4.3	Evaluation condition for extended sources	Collimated beam	N/A
	Conditions applied		N/A
	Most restrictive position (distance from reference point)		N/A
	Angular subtense of the apparent source α and C_6 : (for each condition)		N/A
5.4.3 a	Aperture diameters (for each condition).	11mm	P
5.4.3 b	Angle of acceptance (for each condition).....		P

Measured accessible laser radiation and comparison with AEL: Class I



IEC 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
6	ENGINEERING SPECIFICATIONS		P
6.2	Protective housing		---
6.2.1	General		---
	Protective housing prevents access to energy levels in excess of the AEL for Class 1.		N/A
	Protective housing prevents access to energy levels equivalent to Class 4 and withstands exposures under reasonably foreseeable single fault conditions.		N/A
	Maintenance of Class 1, 1C, 1M, 2, 2M, or 3R (access to emissions of Class 3B or 4 is prevented).		N/A
	Maintenance of Class 3B product (access to emission of Class 4 is prevented).		N/A
6.2.2	Service		N/A
6.2.3	Removable laser system (laser system complies with requirements of Clauses 6 and 7).		N/A
6.3	Access panels and safety interlocks		---
6.3.1	Panel is intended to be removed during operation (or maintenance) and would give access to higher energy levels (see Table 13).		N/A
	Accessible emission (after removal of the panel) corresponds to product Class (designated by "X" in Table 13)		N/A
	Emission through the opening if interlocked panel of Class 1, 1C, 1M, 2, or 2M is removed (Emission < AEL of Class 1M or 2M).		N/A
	Emission through the opening if interlocked panel of Class 3R, 3B, or 4 is removed (Emission < AEL of Class 3R).		N/A
	Requirements regarding reasonably foreseeable single fault condition.		N/A
6.3.2	Override mechanism		N/A
	Behaviour of override in operation when the panel is replaced.		N/A
	Visible or audible warning for override mode.		N/A
6.4	Remote interlock connector		N/A
6.5	Manual reset		N/A
6.6	Key control		N/A
6.7	Laser radiation emission warning		---

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IEC 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.7.1	Laser product is a 3R ($\lambda < 400$ nm; $\lambda > 700$ nm), 1C, 3B or 4 laser systems.		N/A
6.7.2	Audible or visible warning.		N/A
	Warning is failsafe or redundant.		N/A
	Viewing of the visible warning does not require exposure to emissions > AEL for Class 1M and 2M.		N/A
6.7.3	Operational control and laser aperture are provided with a warning device when they are separated more than 2 m from warning device.		P
6.7.4	Visible indication of output aperture if laser emission may be distributed through more than one output.		N/A
6.7.5	Switch for handheld Class 3R device must be depressed for emission (in lieu of emission indicator).		N/A
6.8	Beam stop or attenuator		N/A
6.9	Controls		N/A
6.10	Viewing optics		N/A
	a) Human access to laser radiation in excess of Class 1M prevented when the shutter is opened or attenuation varied.		N/A
	b) Opening of the shutter or variation of the attenuation prevented when exposure to laser radiation in excess of Class 1M is possible.		N/A
6.11	Scanning safeguard		N/A
6.12	Safeguard for Class 1C products		N/A
	a) Human access to laser radiation in excess of AEL for Class 1 measured under Condition 3 is prevented.		N/A
	b) Human access to laser radiation in excess of AEL for Class 3B measured through 3,5 mm aperture at 5 mm distance from applicator is prevented.		N/A
6.13	Walk-in access		N/A
	a) Means provided so that any person inside the housing can prevent activation of Class 3B or 4 laser hazards.		N/A
	b) A warning device provides adequate warning of emission to any person within the housing.		N/A
	c) Where "walk-in" access during operation is intended or reasonably foreseeable, emission of laser radiation that is equivalent to Class 3B or 4 while someone is present inside the enclosure of Class 1, Class 2 or Class 3R product is prevented by engineering means.		N/A

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IEC 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.14	Environmental conditions		---
	- climatic conditions		P
	- vibration and shock		N/A
6.15	Protection against other hazards		---
6.15.1	Non-optical hazards (product safety standard)		P
	- electrical hazards;		P
	- excessive temperature;		P
	- spread of fire from the equipment;		N/A
	- sound and ultrasonics;		N/A
	- harmful substances;		N/A
	- explosion;		N/A
6.15.2	Collateral radiation		N/A
6.16	Power limiting circuit		N/A

7	LABELLING		
7.1	General		---
	Labels durable, permanently affixed		P
	Labels clearly visible		P
	Reading of labels is possible without exposure to laser radiation in excess of AEL for Class 1.		N/A
	Colour combination		P
	Labelling impractical due to the size or design of the product.		P
	Warning label – Hazard symbol (Figure 3)		P
7.2 - 7.7	Text on explanatory label or pictogram (laser class, warning text)		P
7.8	Aperture label		N/A
7.9	Radiation output and standards information		---
	Max output of laser radiation	<1.00E+00 mW	P
	Pulse duration		N/A
	Emitted wavelength(s)	10.5µm	P
	Name and publication date of the standard	IEC 60825-1	P
7.10	Labels for access panels		---
7.10.1 a) – f)	Labels for panels - warning wording used		N/A

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IEC 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
7.10.2	Labels for safety interlocked panels - Warning wording used		N/A
7.11	Warning for invisible laser radiation		N/A
7.12	Warning for visible laser radiation		N/A
7.13	Warning for potential hazard to the skin or anterior parts of the eye - warning wording used		N/A

8	OTHER INFORMATIONAL REQUIREMENTS		
8.1	Information for the user		---
	a) adequate instructions for assembly, maintenance and safe use and description of the classification limitations, if appropriate.		P
	b) additional warning for Class 1M and 2M		N/A
	c) laser beam parameters for radiation above the AEL of Class 1		---
	• Wavelength		N/A
	• Beam divergence		N/A
	• Pulse pattern		N/A
	(pulse duration, repetition rate, ...)		
	• Maximum power or energy output		N/A
	d) safety instruction for embedded laser products and other incorporated laser products.		P
	e) MPE and NOHD for Class 3B and 4 laser products; For collimated beam Class 1M and 2M lasers the extended NOHD (ENOHd).		P
	f) information for the selection of eye protection.		P
	g) reproduction of all required labels and warnings.		P
	h) location of laser apertures		P
	i) list of controls, adjustments of procedures for operation and maintenance - and warning statement.		P
	j) information (compatibility requirements) about laser energy source if not incorporated.		P
	k) additional warning for Class 1, 1M, 2, 2M, and 3R regarding skin or corneal burns.		P
	l) Information for Class 1C products (e.g. warning that repeated application may pose a risk).		N/A
8.2	Purchasing and service information		P
	a) safety classification of each laser product stated in all descriptive material (e.g. brochures).		P

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IEC 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
	b) adequate instructions for servicing available: • warnings and precautions regarding exposure of laser emission above Class 1 • maintenance schedule • list of controls and procedures that could increase accessible emissions • description of displaceable parts • protective procedures for service personnel • reproduction of labels and hazard warnings		P

9	ADDITIONAL REQUIREMENTS FOR SPECIFIC LASER PRODUCTS		
9.1	Applicable other parts of the standard series IEC 60825		---
	IEC 60825-2 (Safety of optical communication systems)		N/A
	IEC 60825-4 (Laser guards)		N/A
	IEC 60825-12 (Safety of free space optical communication systems used for transmission of information)		N/A
9.2	Medical laser products: Class 3B and Class 4 medical laser products comply with IEC 60601-2-22		N/A
9.3	Laser processing machines: Comply with IEC/ISO 11553 series.		N/A
9.4	Electric toys: Comply with IEC 62115		N/A
9.5	Consumer electronic products: Comply with IEC 60950 (IT-equipment) or IEC 60065 (AV equipment)		N/A

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IEC 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict

Test Result Summary

Measured Laser radiation, calculations, judgements and comparison with AEL limits:

Environmental Conditions:

Ambient temperature: (25 ± 2) °C Humidity: $(60 \pm 10)\%$

Single fault conditions

R1, Q1 shorting circuit.

Conclusion

The tested products were Class 1 Laser Product.

Remark:

1. Each Class 1 laser product shall have affixed an explanatory label bearing the words: CLASS 1 LASER PRODUCT or instead, at the discretion of the manufacturer, the same statement may be included in the information for the user.
2. A clear indication in the manual of all locations of the laser product should be provided in the instruction manual.
3. The specification for the safety classification of the laser product should be provided.
4. Adequate instructions or proper assembly, maintenance, and safe use including clear warnings concerning precautions to avoid possible exposure to hazardous laser radiation should be supplied with the laser product.

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-Appendix 1: Photo document



Photo 1: Overall view

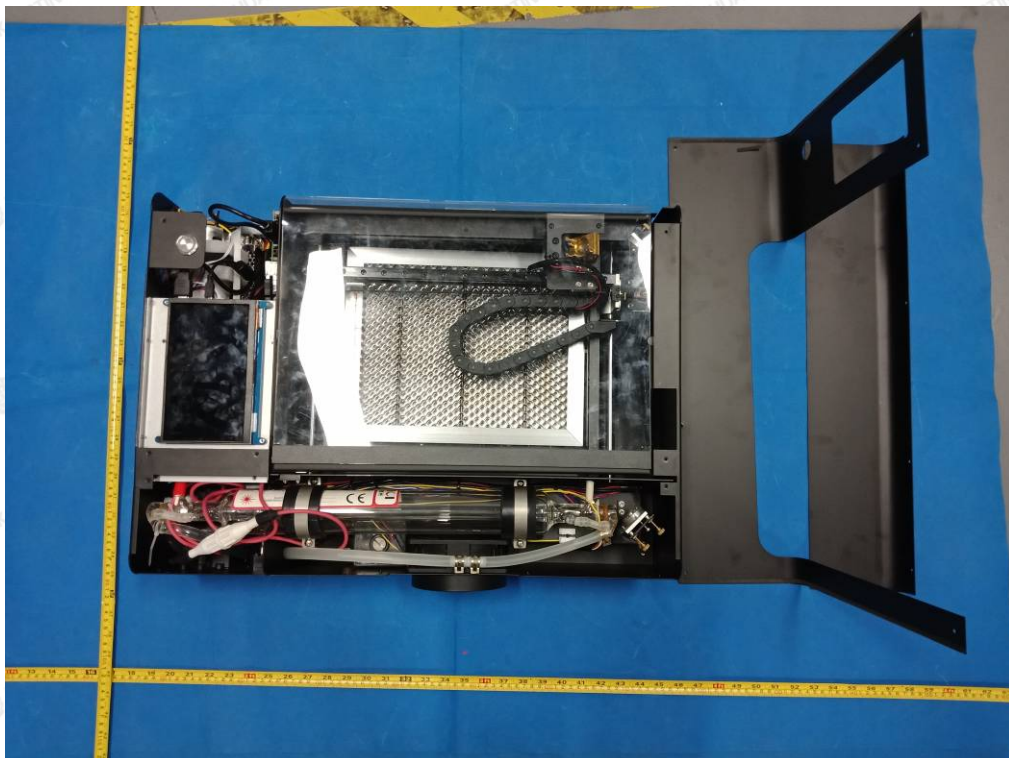


Photo 2: Overall view

-----End of report-----

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