TEST REPORT

On Behalf of

Prepared For :	**ZHEJIANG RECI LASER TECHNOLOGY CO., LTD.** Scientific Research Plant No. 2, Jintang North Road No. 2, Eastern New District, Wenling City, Taizhou City, Zhejiang Province, China
Trade Mark :	**RECI**
Product Name :	**Air cooled fiber laser**
Model(s) :	**FCA1500,** FCA1000, FCA2000
Prepared By:	**Shenzhen ZTS Testing Service Co., Ltd.** 808, Building 1, 7th Industrial Zone, Yulv Community, Yutang Street, Guangming District, Shenzhen, Guangdong, China Tel: 400-8788-298 Tel:0755-23245950 Web: www.zts-test.com Email: zts@zts-test.com
Test Date:	**Dec. 23, 2021 – Dec. 29, 2021**
Date of Report:	**Dec. 29, 2021**
Report No. :	**ZTS21122308FRS**

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of Shenzhen ZTS Testing Service Co., Ltd.

TEST REPORT

IEC 60825-1: 2014

Safety of laser products - Part 1: Equipment classification and requirements

Report	
Report reference No……..:	ZTS21122308FRS
Date of issue……..……:	Dec. 29, 2021
Total number of pages……..:	16 pages
Testing laboratory	
Name……..:	Shenzhen ZTS Testing Service Co., Ltd..
Address……..:	808, Building 1, 7th Industrial Zone, Yulv Community, Yutang Street, Guangming District, Shenzhen, Guangdong, China
Testing location……..:	Same as above
Client	
Name……...:	ZHEJIANG RECI LASER TECHNOLOGY CO., LTD.
Address……...:	Scientific Research Plant No. 2, Jintang North Road No. 2, Eastern New District, Wenling City, Taizhou City, Zhejiang Province, China
Test specification	
Standard……..:	IEC 60825-1: 2014
Test procedure……:	Test report
Non-standard test method……:	N.A.
Test report Form(s) No……..:	IEC60825_1E
Test report Form(s) Originator……..:	ÖVE
Master TRF……..:	Dated 2014-07

Test item Description……:	Air cooled fiber laser
Trademark……:	RECI
Model No……:	FCA1500
Additional Model..... ……	FCA1000, FCA2000
Manufacturer……..:	ZHEJIANG RECI LASER TECHNOLOGY CO., LTD.
Address……..:	Scientific Research Plant No. 2, Jintang North Road No. 2, Eastern New District, Wenling City, Taizhou City, Zhejiang Province, China
Rating……..:	AC 220±10% V, 50/60 Hz

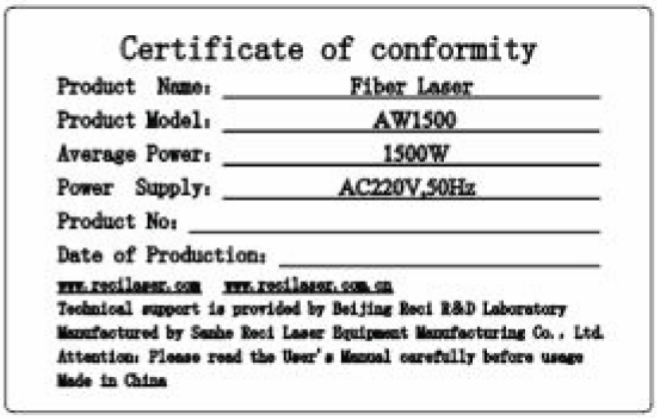
Testing procedure and testing location

Laboratory name……	: Shenzhen ZTS Testing Service Co., Ltd.	
Testing location/address:	: 808, Building 1, 7th Industrial Zone, Yulv Community, Yutang Street, Guangming District, Shenzhen, Guangdong, China	
Testing procedure	: TL ☒ RMT ☐ SMT ☐ WMT ☐ TMP ☐	
Prepared by (Engineer)	: Wilson Bin	Wilson Bin
Tested By (Test Engineer)	: Jeffrey Wang	Jeffrey Wang
Reviewed By (Supervisor)	: Tony Mo	Tony Mo

Shenzhen ZTS Testing Service Co., Ltd. ZTS Approved

Test case verdicts Test case does not apply to the test object : N(A) Test item does meet the requirement : P(ass) Test item does not meet the requirement : F(ail)
General remarks:
Summary of testing: Measurement and classification according to clauses 4 and 5 were applied, other clauses were not considered. After review, pin b/e of component Q11 were short-circuited under fault condition.
Tests performed (name of test and test clause): Clause 4 Classification principles Clause 5 Determination of the accessible emission level and product classification
General product information:

Copy of marking plate:



Summary of Testing:

1. The product has been tested and found in compliance with IEC 60825-1: 2014.
2. The test result complies with the requirements of the relevant standard.

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		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		N/A
	2) 100 s	Class 4	P
	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 ≤ Ti ..... : Number of pulses N and C5..... ..... :		N/A
	3) Pulse duration t > Ti.... .... : Number of pulses N and C5 ..... :		N/A
4.4	Laser products designed to function as conventional lamps.		N/A
	measured at 200 mm distance from closest point of human access (> 5 mrad)		N/A
	Un-weighted radiance L measured at 200 mm distance (comparison with LT = 1 MWm-2sr-1/) under reasonably foreseeable single fault conditions.		N/A
	Evaluation of emission according to IEC 62471 series (optional): Standard applied (IEC 62471 series).. ....: Risk Group..... : Labeling..... : 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**		
5.1	Tests		--
	Compliance under reasonably foreseeable single fault conditions.		--
5.3	Determination of the class of the laser product ... : For Class 1C: vertical safety standard applied with		--

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Clause	Requirement – Test	Result - Remark	Verdict
	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 ..... :	Condition 7mm,	P
	Reference point : ..... :	Focal point	P
	Measurement distance ..... : (for each condition)	Condition 3: 100mm	P
5.4.3	Evaluation condition for extended sources		N/A
	Conditions applied ..... :		N/A
	Most restrictive position ..... : (distance from reference point)		N/A
	Angular subtense of the apparent source and C6: (for each condition)		N/A
5.4.3 a	Aperture diameters (for each condition). ..... :		N/A
5.4.3 b	Angle of acceptance (for each condition)..... :		N/A
6	**ENGINEERING SPECIFICATIONS**		
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).		P
	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		N/A

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Clause	Requirement – Test	Result - Remark	Verdict
	(Emission < AEL of Class 1M or 2M).		
	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		--
6.7.1	Laser product is a 3R (λ<400 nm; λ>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.		N/A
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		--
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
6.12	Safeguard for Class 1C products		N
	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		N/A

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Clause	Requirement – Test	Result - Remark	Verdict
	prevented.		
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
6.14	Environmental conditions		--
	- climatic conditions		--
	- vibration and shock		--
6.15	Protection against other hazards		--
6.15.1	Non-optical hazards (product safety standard)		N/A
	- electrical hazards;		N/A
	- excessive temperature;		N/A
	- 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		N/A
	Labelling impractical due to the size or design of the product.	Affix to product	N/A
	Warning label – Hazard symbol (Figure 3)		P
7.2 - 7.7	Text on explanatory label or pictogram (laser class, warning text)		N/A
7.8	Aperture label		N/A
7.9	Radiation output and standards information		--
	Max output of laser radiation ..... :		N/A
	Pulse duration ..... :		N/A
	Emitted wavelength(s) ..... :		-
	Name and publication date of the standard..... :	IEC 60825-1:2014	P

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Clause	Requirement – Test	Result - Remark	Verdict
7.10	Labels for access panels		--
7.10.1 a) - f)	Labels for panels - warning wording used ..... :		N/A
7.10.2	Labels for safety interlocked panels - Warning wording used ..... :		N/A
7.11	Warning for invisible laser radiation ..... :		P
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..... :	Not exceed AEL of class 3B	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.		N/A
	b) additional warning for Class 1M and 2M		N/A
	c) laser beam parameters for radiation above the AEL of Class 1		--
	- Wavelength ..... :	900-1200 nm	P
	- Beam divergence ..... :		P
	- Pulse pattern ..... : (pulse duration, repetition rate, .)		N/A
	- Maximum power or energy output ..... :		N/A
	d) safety instruction for embedded laser products and other incorporated laser products.		N/A
	e) MPE and NOHD for Class 3B and 4 laser products; For collimated beam Class 1M and 2M lasers the extended NOHD (ENOHD).		N/A
	f) information for the selection of eye protection.		N/A
	g) reproduction of all required labels and warnings.		N/A
	h) location of laser apertures		P
	i) list of controls, adjustments of procedures for operation and maintenance - and warning statement.		N/A
	j) information (compatibility requirements) about laser energy source if not incorporated.		N/A
	k) additional warning for Class 1, 1M, 2, 2M, and 3R regarding skin or corneal burns.		N/A
	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
	b) adequate instructions for servicing available: - warnings and precautions regarding exposure of		N/A

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Clause	Requirement – Test	Result - Remark	Verdict
	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		
9	**ADDITIONAL REQUIREMENTS FOR SPECIFIC LASER PRODUCTS**		
9.1	Applicable other parts of the standard series IEC60825		--
	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

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

	TABLE: Critical components information				
Object / part No	**Manufacturer/ trademark**	**Type / mode**	**Technical data**	**Standard**	**Mark(s) of conformity1**
CO2 Laser Tube	Reci Laser	/	AC 220±10%V, 1080±3nm	IEC 60825-1:2014	Test with equipment
Supplementary information: 1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

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

# Measurements (default method)			
Measurement geometry (Table 11):			
Condition1			☐
Condition3			☒
Wavelength(nm)			1080
Aperture diameter (mm)			7
Measurement distance (mm)			100
Measurement under normal condition:			
Emission level expressed in	Symbol	Unit	Measured value
Irradiance	E	W/m^2	-
Radiant power	P	W	1510W
Radiant exposure	H	J/m^2	-
Radiant energy	Q	J	-
Measurement Value			
No.	single-fault condition:		

Note:
1. Normal supply voltage: 220±10%V to the test which is supplied by the client.
2. Max. obtainable radiant power 1500W is used for the classification of this laser product under this measurement condition.

Summary :
The emission level of this laser product is greater than Class3B, so the product laser safety level is **Class 4**.

Photo :

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

※※※※※ END OF REPORT ※※※※※