


<b>TEST REPORT</b> <b>IEC 60825-1: 2007 2<sup>nd</sup> Edition</b> <b>Safety of laser products --</b> <b>Part 1: Equipment classification and requirements</b>	
<b>Report Reference No</b> .....	OM-2014-B0005
<b>Date of issue</b> .....	Nov. 27, 2014
<b>Applicant's name</b> .....	Sensortek Technology Corp.
<b>Address</b> .....	6F-1, No. 5, Taiyuan 1st St., Jhubei City, Hsinchu County 302, Taiwan
<b>Testing Laboratory</b> .....	SGS Taiwan Ltd., Optics Laboratory
<b>Address</b> .....	No. 33, Wu Chyuan Road, New Taipei Industrial Park, Wu Ku District, New Taipei City 24886, Taiwan (R.O.C.)
<b>Test specification:</b>	
Standard .....	IEC 60825-1 : 2007 (2nd Edition)
Test procedure .....	Same as above
Non-standard test method.....	N/A
<b>Tested equipment</b> .....	Ambient Light Sensor and Proximity Sensor with IR VCSEL
<b>Model number / Type</b> .....	STK3310-SA
<b>Conclusion:</b>	In the opinion of SGS, the submitted Device Under Test (DUT) complies with <u>Class 1 Laser Product</u> of the above test specification.
	Approved by: Calvin Tzou Technical Manager Nov. 27, 2014
	 <hr style="width: 20%; margin: auto;"/> Signature
<p>Details and test results are given in subsequent pages of this report.            This report refers only to the unit(s) submitted for test. This report shall not be reproduced except in full, without 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.            This document is issued by the company under its General Conditions of Service accessible at <a href="http://www.sgs.com/terms_and_conditions.htm">http://www.sgs.com/terms_and_conditions.htm</a>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.            Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.</p>	

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<b>TEST REPORT</b>	
<b>Test item description</b> .....	Ambient Light Sensor and Proximity Sensor with IR VCSEL
Trademark .....	Sensortek Technology Corp.
Manufacturer's name .....	Sensortek Technology Corp.
Address.....	6F-1, No. 5, Taiyuan 1st St., Jhubei City, Hsinchu County 302, Taiwan
Model number / Type .....	STK3310-SA
Serial number .....	N/A
Rating(s) .....	DC 12.5 mA
Mass of the equipment (kg) .....	< 0.2 kg
<b>Particulars: test item vs. test requirements</b>	
Equipment mobility .....	Mobile
Operating condition.....	Pulsed
Mains supply tolerance (%).....	N/A
Tested for IT power systems .....	N/A
IT testing, phase-phase voltage (V) .....	N/A
Laser Class of equipment .....	Class 1 Laser product
Protection against ingress of water .....	N/A
<b>Test case verdicts</b>	
Test case does not apply to the test object :	N (Not applicable)
Test item does meet the requirement .....	P (Pass)
Test item does not meet the requirement ...:	F (Fail)
<b>Testing</b>	
Date of receipt of test item .....	Nov. 18, 2014
Date(s) of performance of test .....	Nov. 18, 2014 ~ Nov. 18, 2014

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**Copy of marking plate**

None (the statement included in the user instructions of the product)

**Summary of testing:**

This test report was issued for classifying the LED/ Laser radiation only.  
The compliance with the requirements of other applicable standards may be needed in additional test reports.

**General product information:**

The tested device was a Proximity Sensor with 1 built-in IR LASER Diode.  
The wavelength range was single, from 840 nm to 860 nm, the peak wavelength was 843.9 nm.  
The tested device supplied with DC 12.5 mA.  
The tested equipment was Class 1 LASER Product.

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IEC / EN 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
4	Engineering specifications		P
4.1	General remarks		N
	Modification	New model	N
4.2	Protective housing		P
4.2.1	general	The Laser radiation is accessible	P
4.2.2	Service	No such condition	N
4.2.3	Removal laser system		N
4.3	Access panels and interlocks	No operator access area inside the equipment	N
4.3.1	Access panels of protective housing	No access panels	N
	Product Class	Class 1 Laser product	P
	Accessible emission during the removal of access panel		N
	The access panel intended to be removed during maintenance or operation		N
	The removal of the panel gives access to laser radiation levels designated by "X" in the table		N
	Accessible emissions after removal		N
	Safety interlock shall be provided if		N
	a) The access panel is intended to be removed during maintenance or operation	No access panel	N
	b) The removal gives access to laser radiation in excess of the AEL of Class 3A		N
4.3.2	Deliberate override mechanism for access panels		N
4.4	Remote interlock connector		N
4.5	Manual reset	Not a Class 4 Laser product	N
4.6	Key control		N
4.7	Laser radiation emission warning	Specified on the user manual / product specs	P
4.7.1	Each Class 3R laser system in the wavelength range below 400 nm and above 700 nm and each Class 3B and Class 4 laser system shall satisfy the following.	Not a Class 3B or Class 4 Laser product	N
4.7.2	Audible or visible warning	Class 1 Laser Product	N
4.7.3	Operational control and laser aperture More than 2 meters separated controls and apertures		N
4.7.4	Laser emission distribution through more than one output	1 output	N
4.8	Beam stop or attenuator	Not a Class 3B or Class 4 Laser product	N
4.9	Controls	No controls	N
4.10	Viewing optics	No viewing optics	N
	a) prevent human access to laser radiation in excess of AEL for Class 1 laser product		P
	b) prevent opening of the shutter or variation of the		P

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IEC / EN 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
	attenuator when exposure to laser radiation in excess of AEL for Class 1 laser product		
4.11	Scanning safeguard	Not a scanning radiation	N
4.12	"Walk-in" access	No "walk-in" access	N
	a) means shall be provided so that any person inside the housing can prevent activation of a laser hazard that is equivalent to Class 3B or Class 4;		N
	b) a warning device shall be situated so as to provide adequate warning of emission of laser radiation equivalent to Class 3R in the wavelength range below 400 nm and above 700 nm, or of laser radiation equivalent to Class 3B or Class 4 to any person who might be within the housing;		N
	c) where "walk-in" access during operation is intended or reasonably foreseeable, emission of laser radiation that is equivalent to Class 3B or Class 4 while someone is present inside the enclosure of a Class 1, Class 2, or Class 3R product shall be prevented by engineering means.		N
4.13	Environmental conditions	Remains the same class in the declared environment	P
	- climate condition	See the test results	P
	- vibration and shock	No special requirements	N
4.14	Protection against other hazards	No other hazards concerned	N
4.14.1	Non-optical hazards - electrical hazard - excessive temperature - spread of fire from the equipment - sound and ultrasonic - harmful substances - explosion	- DC only for the equipment - No obvious temperature rise after continuous operation - No sound and ultrasonic generating source - No harmful substances generated - No explosion concern	N
4.14.2	Collateral radiation	No hazardous collateral radiation	N
5.	Labelling		P
5.1	General	Complied	P
	Laser product class	Class 1 Laser product	P
5.2	Class 1 explanatory label provided on the product	Specified on the user manual / product specs	P
	Optional: Class 1 explanatory label provided in the user manual		N
	Class 1M explanatory label provided on the product		N

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IEC / EN 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Optional: Class 1M explanatory label provided in the user manual		N
5.3	Class 2 laser product warning and explanatory label		N
	Class 2M laser product warning and explanatory label		N
5.4	Class 3R laser product warning and explanatory label		N
5.5	Class 3B laser product warning and explanatory label		N
5.6	Class 4 laser product warning and explanatory label		N
5.7	Aperture label	Not necessary	N
5.8	Radiation output and standards information		P
	-max output of radiation	3.82E+00μ J	P
	-pulse duration	on 0.39 ms, off 50 ms	P
	-emitted wavelength	Single	P
	-the name and publication date of the standard	IEC / EN 60825-1	P
5.9	Labels for access panels	No access panels	N
5.9.1	Labels for panels	No accessible panel to open	N
	Marking a) – f)		N
5.9.2	Labels for safety interlocked panels		N
	Marking		N
5.10	Warning for invisible laser radiation		P
5.11	Warning for visible laser radiation		N
6	Other informational requirements		P
6.1	Following information for the user shall be provided	See below	P
	a) instruction for proper assembly, maintenance, and safe use including clear warning	Instruction provided	P
	b) statement for appropriate units of beam divergence		N
	c) statement in appropriate units of beam divergence for wavelength, beam divergence, pulse duration and maximum output	Instruction provided	P
	d) For embedded laser products and other incorporated laser products, information to describe the incorporated laser (see item c)). The information shall also include appropriate safety instructions to the user to avoid inadvertent exposure to hazardous laser radiation. This is particularly relevant for embedded laser products that are classified as Class 1, Class 1M, Class 2 or Class 2M but		N

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IEC / EN 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
	where intrabeam viewing to accessible emission levels in excess of the AELs of these classes is possible during maintenance. In this case the manufacturer shall include a warning that intrabeam viewing of the laser shall be prevented.		
	e) Where appropriate and relevant, the applicable MPE and NOHD for Class 3B and Class 4 laser products. Since the NOHD greatly depends on the beam delivery system and optical elements placed in the beam, when this is considered as relevant, it is recommended that the different NOHD values are given for the different attachments or beam delivery systems. If there is a variable beam divergence, the NOHD could be given for some selected values of divergence. When an MPE and NOHD value is stated, the assumed exposure duration for the determination of these values shall also be stated. For collimated-beam Class 1M and Class 2M lasers, the extended NOHD (ENOHD) shall be stated, where appropriate and relevant.		N
	f) Where appropriate, information for the selection of eye protection. This shall include the required optical density as well as irradiance or radiation exposure levels that might be incident on the surface of the eye protection equipment, so that resistance levels can be determined.		N
	g) statement of the compatibility requirements for laser energy source	Provided in the instruction	N
	h) A clear indication in the manual of all locations of laser apertures through which laser radiation exceeding the Class 1 AEL is emitted.		N
	i) List of controls, adjustments and procedures for operation and maintenance, including the warning "Caution – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure" (or alternatively, equivalent appropriate warnings).		N
	j) In the case of laser products that do not incorporate the laser energy source necessary for laser emission, a statement of the compatibility requirements for a laser energy source to ensure safety.		N

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IEC / EN 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.2	Purchasing and servicing information shall be provided		N
	a) the safety classification shall be stated in all attached documents		P
	b) instruction for dealers and distributors upon request for service and adjustment	No service or adjustments necessary	N
7	Additional requirements for specific laser products		P
7.1	Other parts of the standard series IEC 60825	Not used	N
	For specific applications, one or other of the following IEC 60825 series may be applicable (see also Bibliography).		N
	– IEC 60825-2, Safety of optical fibre communication systems (provides application notes and examples)		N
	– IEC 60825-4, Laser guards (provides design and construction information for laser guards and materials especially where high power lasers are used)		N
	– IEC 60825-12, Safety of free space optical communication systems used for transmission of information.		N
	Further information may be found in:		N
	– IEC/TR 60825-3, Guidance for laser displays and shows		N
	– IEC/TR 60825-5, Manufacturer's checklist for IEC 60825-1 (suitable for use in a safety report)		N
	– IEC/TR 60825-8, Guidelines for the safe use of laser beams on humans		N
	– IEC/TR 60825-9, Compilation of maximum permissible exposure to incoherent optical radiation (broadband sources)		N
	– IEC/TR 60825-10, Application guidelines and explanatory notes to IEC 60825-1		N
	– IEC/TR 60825-13, Measurements for classification of laser products		N
	– IEC/TR 60825-14, A user's guide		N
	– IEC 62471 (CIE S009), Photobiological safety of lamps and lamp systems		N
7.2	Medical laser product		N
7.3	Laser processing machines		N
7.4	Electric toys		N
7.5	Consumer electronic products	IEC 60950 (IT equipment)	P
8	Classification (Normal operating condition)		P

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IEC / EN 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.2	Classification responsibilities	Manufacturer	P
8.3	Classification rules	See below	P
8.3 a	Radiation of a single wavelength		P
8.3 b	Radiation of multiple wavelengths		N
	1). Laser product emission two or more wavelengths in spectra regions shown as additive in Table 5		N
	2) Laser product emission two or more wavelengths in spectra regions not shown as additive Table 5		N
8.4 c	Radiation from extended source		P
8.4 d	Non-circular and multiple sources		N
8.4 e	Time basis	See below	P
	1) 0.25 seconds		N
	2) 100 seconds	Considered	P
	3) 30000 seconds		N
	Calculations and limits:		P
8.4 f	Repetitively pulsed or modulated laser		P
	1) Exposure from a single pulse not exceeding the AEL for a single pulse		N
	2) Average power of a pulse train		P
	3a) The average pulse energy from pulses within a pulse train not the AEL for a single pulse multiple by the correction factor $C_5$		P
	AEL for continued operation used		N
	3b) Total-on-time-pulse(TOTP) method used		N
9	Determination of the accessible emission level		P
9.1	Tests	The maximum optical output power was tested	P
9.2	Test conditions per Clause 9.2 applied		P
	Measurement of laser radiation	Class 1 Laser Product	P
9.3	Measurement Geometry		P
	a) aperture diameter (mm)	7 mm	P
	b) measurement distance (mm)	70 mm to 100 mm	P
	c) angle of acceptance	See below	P
	i) photochemical limits	11 mrad	P
	ii) all other limits	100 mrad	P

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

**Conditions**

1. Tests were proceeded on the tested product supplied with DC 12.5 mA.
2. Ambient temperature: (25 ± 2) °C, Humidity: (60 ± 10)%
3. Aperture diameter: 7 mm
4. Measure distance: 70 mm to 100 mm
5. 100 s time based
6. Wavelength: 840 nm to 860 nm single wavelength,  $\lambda_p=843.9$  nm

**Single fault conditions**

C1 and C2 short circuit

**Calculation of the thermal AEL**

After calculated for 700 nm to 1050 nm, the critical limit for Class 1 is .....AEL<sub>single</sub> = 3.82E+00 μ J

**Measurements and Results for Laser**

	AEL
	700 nm to 1050 nm
Class 1 AEL	3.82E+00 μ J
Client's Results	1.06E+00 μ J
Comparison	Client's results < AEL 1
Remark	

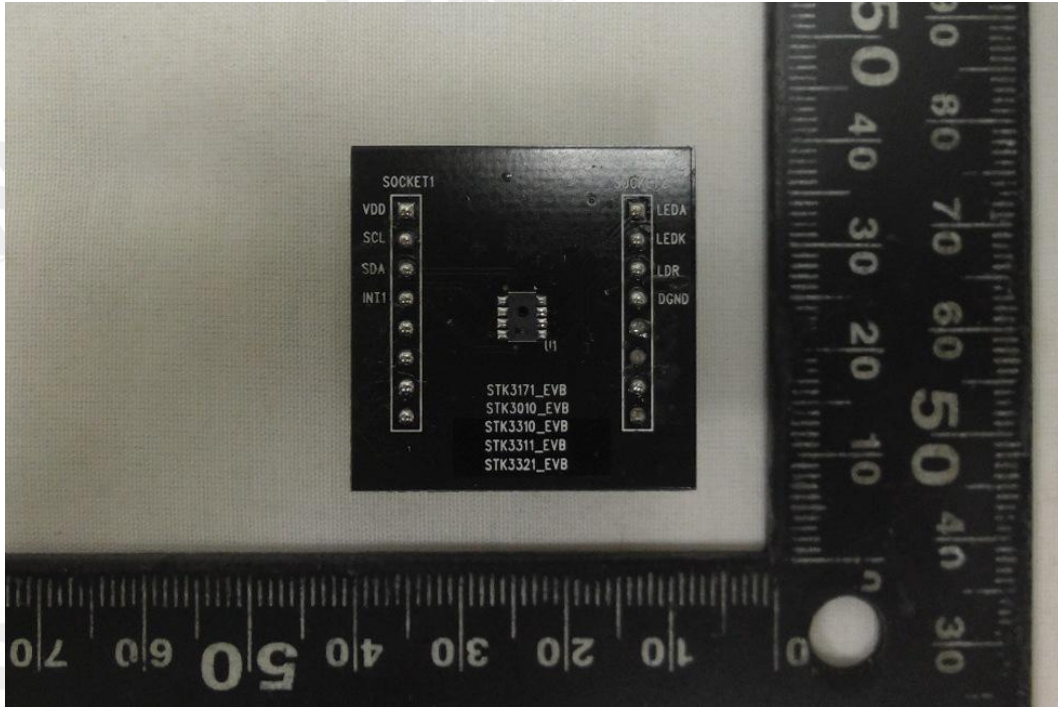
**Conclusion**

The tested products were **Class 1 Laser Product** with normal condition.

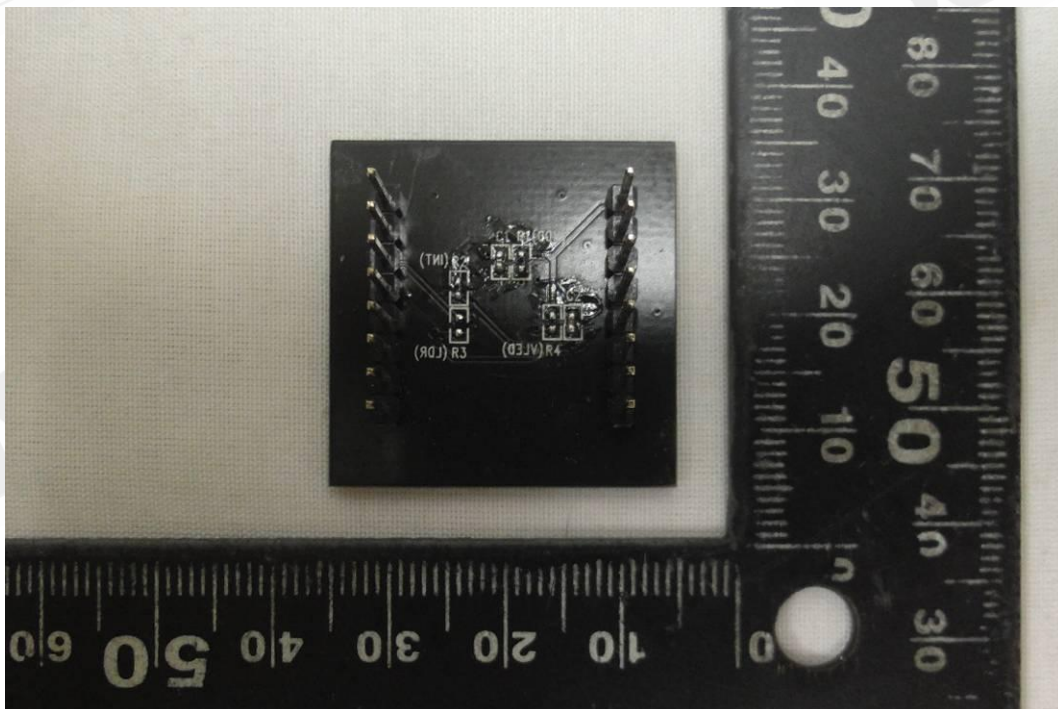
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## Attachment Photos



Top View



Back View

**- End of Report -**

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