TEST REPORT

IEC 60825-1

Safety of laser products

Part 1: Equipment classification, requirements and user's guide

Section two: Manufacturing requirements

Report reference No ..... :	10-1333-0057
Tested by ..... :	CHUL-JOO JEON
Approved by ..... :	YOUNG-HWAN KIM
Date of issue ..... :	2010-04-22

This report is based on a blank test report that was prepared by SGS Fimko Ltd using information obtained from the TRF originator (see below)

CB Testing Laboratory name ..... :	
Address ..... :	KTL (Korea Testing Laboratory)
Testing location ..... :	CBTL ☒ SMT ☐ TMP ☐
Address ..... :	222-13, Guro-3dong, Guro-gu, Seoul, 152-718, Korea.

Applicant's name ..... :	Suprema Inc
Address ..... :	16F Parkview Office Tower, Jeongja-dong, Bundang-gu, Seongnam, Gyeonggi, 463-863 Korea

Test specification

Standard ..... :	IEC 60825-1:1993 + A1:1997 + A2:2001
Test procedure ..... :	CB
Non-standard test method ..... :	-

Test Report Form No. ..... :	IEC60825_1C / 01-04
TRF originator ..... :	Underwriters Laboratories Inc.
Master TRF ..... :	Dated 2001-04

Test item description ..... :	Scanner
Trademark ..... :	-
Model and/or type reference ..... :	RealScan-F
Rating(s) ..... :	12 Vdc, Class 1 LED product

Test item particulars	
Equipment mobility ..... :	**movable** / ~~stationary / fixed / permanent connection / for building-in~~
Protection Class of equipment ..... :	~~Class I / Class II~~ / **Class III**
Mass of equipment (kg) ..... :	<18 kg
Classification of laser product	
Laser and/or LED product class of the equipment ..... :	Class 1
Laser and/or LED class of the radiation employed ..... :	-
Maximum class of the embedded laser/LED (if an embedded laser/LED is employed) ..... :	-
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)
Test object not checked ..... :	NC
Testing	
Date of receipt of test item ..... :	2010-04-12
Date(s) of performance of test ..... :	2010-04-14~ 2010-04-21

General remarks:

This test report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

This report shall not be reproduced except in full without the written approval of the testing laboratory.

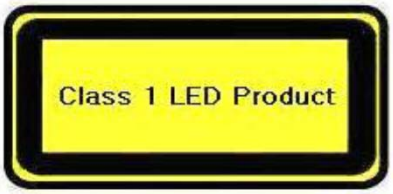
The test results presented in this report relate only to the item(s) tested.
"(see remark #)" refers to a remark appended to the report.
"(see Annex #)" refers to an annex appended to the report.
Throughout this report a point is used as the decimal separator.

List of test equipment must be kept on file and available for review.

General product information:

-

Copy of the Marking Plate and Warning Labels:



Summary of testing:

See page 9

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Cl.	Requirement – Test	Result – Remark	Verdict
4	**ENGINEERING SPECIFICATIONS**		P
4.1	General remarks		P
4.1.1	Modification		P
4.2	Protective housing		N
4.2.1	General		N
4.2.2	Service		N
4.2.3	Removable laser system		N
4.3	Access panels and safety interlocks		N
4.3.1	Access panels of protective housing	No Access panels	N
	Product Class .....:		-
	Accessible emission during 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 .....:		-
4.3.2	Deliberate override mechanism		N
4.4	Remote interlock connector	Class 1 LED product	N
4.5	Key control	Class 1 LED product	N
4.6	Laser radiation emission warning		N
4.6.1	Audible or visible warning	Class 1 LED product	N
4.6.2	Operational control and laser aperture	Class 1 LED product	N
4.6.3	Laser emission distributed through more than one output	Class 1 LED product	N
4.7	Beam stop or attenuation	Class 1 LED product	N
4.8	Controls	Class 1 LED product	N
4.9	Viewing optics	Class 1 LED product	N
	a) human access to laser radiation in excess of Class 1M prevented when the shutter is opened or attenuation varied		N
	b) opening of the shutter or variation of the attenuation prevented when exposure to laser radiation in excess of Class 1M is possible		N
4.10	Scanning safeguard		N
4.11	Alignment aids		N

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Cl.	Requirement – Test	Result – Remark	Verdict
4.12	Walk-in access		N
	a). Means provided so that any person inside the housing can prevent activation of a Class 3B or 4 laser hazard	No walk-in access	N
	b). A warning device provides adequate warning of emission to any person within the housing		N
4.13	Environmental conditions		NC
	- climatic conditions		NC
	- vibration and shock		NC
4.14	Protection against other hazards		NC
4.14.1	Non-optical hazards		NC
	- electrical hazards;		NC
	- excessive temperature;		NC
	- spread of fire from the equipment;		NC
	- sound and ultrasonic;		NC
	- harmful substances;		NC
	- explosion;		NC
4.14.2	Collateral radiation		NC

5	**LABELLING**		P
5.1	General		P
	LASER PRODUCT CLASS .....:	Class 1 LED product	P
5.2	Class 1 explanatory label provided on the product		N
	Optional: Class 1 explanatory label provided in the user manual	Provided in the user manual	P
	Class 1M explanatory label provided on the product		N
	Optional: Class 1M explanatory label provided in the user manual		N
5.3	Class 2 explanatory and warning label		N
	Class 2M explanatory and warning label		N
5.4	Class 3R explanatory and warning label		N
5.5	Class 3B explanatory and warning label		N
5.6	Class 4 explanatory and warning label		N
5.7	Aperture label .....:		N
5.8	Radiation output and standards information		N
	Maximum output of laser radiation .....:		N
	Pulse duration .....:		N

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Cl.	Requirement – Test	Result – Remark	Verdict
	Emitted wavelength(s) .....:		N
	The name and publication date of the standard .:		N
5.9	Labels for access panels		N
	RADIATION CLASS.....:		N
5.9.1	Labels for panels		N
	Warning used.....:		-
5.9.2	Labels for safety interlocked panels		N
	Warning used.....:		-
5.10	Warning for invisible laser radiation .....:		N
5.11	Warning for visible laser radiation .....:		N
5.12	Warning for LED radiation .....:	see page 3	P

6	**OTHER INFORMATIONAL REQUIREMENTS**		P
6.1	Information for the user		P
6.2	Purchasing and service information		P

7	**ADDITIONAL REQUIREMENTS FOR SPECIFIC LASER PRODUCTS**		N
7.1	Medical laser products		N
	Class 3B and Class 4 medical laser products comply with IEC 60601-2-22		N
	Medical laser products provided with instructions for calibration of measurement system		N
7.2	Applicable other parts of the standard series IEC 60825		N
	IEC 60825-2 (OFCSs)		N
	IEC 60825-4 (guards)		N
	IEC/TR 60825-3 (laser shows)		N
	IEC/TR 60825-5 (manf.'s checklist)		N
	IEC/TS 60825-6 (visible info transmission)		N
	IEC/TS 60825-7 (non-visible info transmission)		N
	IEC 60825-8 (medical equipment)		N
	IEC/TR 60825-9 (incoherent MPEs)		N

8	**CLASSIFICATION**		P
8.2	Description of laser classes		P
8.3	Classification responsibilities		P
8.4	Classification rules		P

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Cl.	Requirement – Test	Result – Remark	Verdict
8.4a	Radiation of a single wavelength		P
8.4b	Radiation of multiple wavelengths		P
	1). Laser product emission two or more wavelengths in spectral regions shown as additive in Table 5.....:		P
	2). Laser product emission two or more wavelengths in spectral regions not shown as additive in Table 5.....:		N
8.4c	Radiation from extended sources		N
	Value of angular subtence α (mrad).....:	Considered less than 1.5 mrad	-
8.4d	Non-circular and multiple sources		P
8.4e	Time basis		P
	i) 0.25s		N
	ii) 100s		P
	iii) 30000s		N
8.4f	Repetitively pulsed or modulated lasers		N
	i) exposure from a single pulse not exceeding the AEL for a single pulse		N
	ii) average power for a pulse train		N
	iii) the average pulse energy from pulses within a pulse train not exceeding the AEL for a single pulse multiplied by the correction factor C_5		N
	AEL for continued operation used….....:		N
	Total-on-time-pulse (TOTP) method used…….....:		N

9	**MEASUREMENTS FOR CLASSIFICATION**		P
9.1	Tests		P
9.2	Test conditions per Clause 9.2 applied	a), b), d), e), f) and g)	P
	Measured laser radiation.....:	See details in page 9	-
9.3	Measurement geometry		P
	a) aperture diameter (mm).....:	See details in page 9	P
	b) measurement distance (mm).....:	See details in page 9	P
	c) angle of acceptance γ .....:		P
	i) photochemical limits….....:		N
	ii) all other limits.....:	100 mrad	P

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Supplementary information

	EQUIPMENT MANUFACTURE INFORMATION (DATA SHEET) ABOUT THE COMPONENT CONTAINING LASER		
	Manufacturer ..... :		-
	Type designation ..... :		-
	Structure ..... :		-
	Wavelength ..... :		-
	Output power (min. and max.) ..... :		-
	Radiation ..... :		-
	Continuous..... :		-
	Pulsed ..... :		-
	Pulse time ..... :		-
	Pulse repetition frequency ..... :		-
	Others ..... :		-

	MEASUREMENT EQUIPMENT		
	Type of equipment.....:	See page 11	-
	Manufacturer .....:		-
	Type designation .....:		-
	Others .....:		-

	LEDs		
	Manufacturer.....:	OSRAM	-
	Type designation .....:	SFH 4250	-
	Wavelength .....:		-
	Others .....:		-

Details of measurement procedure and measurement results:

1. Measuring condition

- The radiant power has been measured under normal and fault condition.
- Ambient temperature: 22.8 ^{o}C, humidity: 31.0 %
- Measurement under condition 1 is omitted because condition 2 is obviously severer than condition 1 in this product.

2. Measured Results

- Measured wavelength: 859 nm
- Measured radiation power:

	Using 7 mm aperture stop at close to output mirror
Condition 2	0.243 mW

3. AEL (Accessible Emission Limit)

Emission duration	Radiant power	AEL	CLASS
100s	0.243 mW	$3.9 \times 10^{-4} \times C_4 \times C_7$ W $= 3.9 \times 10^{-4} \times 2.08 \times 1$ W = 0.811 mW	1

4. Classification

The product is classified as Class 1.

5. Measuring Instrument

Name	Maker	Model No.	Serial No.
Optical Power Meter	Yokogawa	329201	27LU0017
Sensor	Yokogawa	329303	27LU3010
Wavelength meter	Coherent	33-2650	W0 198
Beam analyzer	Spiricon	LBA-PC series	380475

Photographs

<Fig. 1>

<Fig. 2>

<Fig. 3>