

Laser Product Safety Test Report

Product Classification Assessment using IEC / EN 60825-1:2014
(Safety of laser products Part 1: Equipment classification and requirements)

1. Product Identification and Supplier

Product Name	CUBE2 & CUBE2 PRO
Identification	Serial Number L22101200009
Description	Laser Projector for professional entertainment use
Country of Origin	China
Manufacturer / Supplier	Magnum Lighting Technology Co., Ltd 12/F SanToi Building, 137-139 Connaught Road, Central Hong Kong
Contact Details	E: b2b@wickedlasers.com
Contact Name	Steve Liu



2. Overall Assessment Classification

Class 4 - The accessible emission created by the device is within the Class 4 performance criteria. Laser products in this class emit light for which intrabeam (direct) viewing and skin exposure is hazardous, and for which the viewing of diffuse reflections may be hazardous. Specific engineering features must be included in such products, as should appropriate labeling and information to the user.

3. IEC/EN 60825-1:2014 Compliance Status

PASS – The appropriate engineering features, product safety warning labelling, and user information were present to meet the Class 4 compliancy tests prescribed in IEC / EN 60825-1:2014.

4. Device Description and Laser Source

The device comprises a compact sealed enclosure through which projected beams are only accessible from the small designated output aperture. The device is intended to create lighting effects and graphics/text images, which are used in a professional context for entertainment lighting and special effects. The laser projection device houses three solid-state semiconductor laser diodes (red, green & blue), combined into a single output beam, that is deflected through approximately 30 – 50 degrees in the x and y planes, by galvanometers, exiting through a glass output aperture. The device may be powered from an external source, or its own internal rechargeable battery. Control of the projector’s output is achieved through the connection of a compatible external control device such a computer, tablet, or smartphone, via either a wired or wireless network connection. Or, in the case of the ‘PRO’ variant, additional control is afforded via the industry-standard 25-way analogue control interface defined by the International Laser Display Association (www.ilda.com)

Two variants of the device are available; the CUBE2, and CUBE2 PRO, with the latter’s differentiating features being higher bandwidth optical scanners, to create higher quality graphics and project over slightly wider angles, and the provision of the 25-way ILDA connections. Otherwise, the output power performance, functionality, and engineered safety features of the two variants are identical. This was confirmed by Magnum Lighting’s technical team, who advised the interlock circuitry, beam block, and laser power as being the same, but additionally the CUBE2 PRO variant accommodates ANDing the external ILDA Shutter signal with the device’s internal RGB Driver Enable control, when an external ILDA control source is used.

5. Testing

The most hazardous emission is created when all three output beams are stationary and outputting at maximum power. For the purposes of checking the emitted power levels against the manufacturer’s specifications, and the accessible emission, the rationale for testing followed the process described in the EN 60825-1:2014 standard using a calibrated spectroradiometer, thermal laser power meter, and aperture.

Accessible Emission < 2.5 W CW, (445 nm : 1.18 W, 520nm : 0.77 W, 638 nm : 0.38 W)

1. Tests were carried out at LVR’s testing facility, under controlled conditions.
2. Thermal stability less of a concern as the device is comfortably in the Class 4 category.
3. All measurements were undertaken within a temperature range of 18C-24C, with a relative humidity between 30%-70%, monitored by a Testo Temperature / Humidity Logger / Alarm. (22C 57.1% Testo logged)

Control of the device was tested using version 0.9.47 of the LaserOS software running on a Windows 10 Pro computer. Connections were tested using both a wired and wireless connection. It was noted that if the signal is lost, the device correctly requires user intervention once the connection is re-established.

6. Class 4 Applicable Engineering Controls

Para 6.2	Protective housing	PRESENT
Para 6.3	Access panels / safety Interlocks	N/A ¹
Para 6.4	Remote interlock connector	PRESENT
Para 6.5	Manual reset	PRESENT ²
Para 6.6	Key control	PRESENT - removable physical key
Para 6.7	Laser radiation emission warning	PRESENT - 2x white LEDs at rear of device
Para 6.8	Beam stop or attenuator	PRESENT - electronic signal
Para 6.9	Controls in safe location	PRESENT
Para 6.10	Viewing optics	N/A
Para 6.11	Scanning safeguard	N/A
Para 6.12	Safeguard for Class 1C products	N/A
Para 6.13	“Walk-in” access	N/A
Para 6.14	Environmental conditions	NOT TESTED ³ – temperature, relative humidity
Para 6.15	Protection against other hazards	PRESENT
Para 6.16	Power limiting circuit	N/A

¹ Sealed enclosure. No user serviceable parts inside the protective housing. Tools required to remove the protective housing.

² The key-switch must be turned to the off position, then reenabled, following power up, or an interlock interruption.

³ Device tested at normal room temperature in stable conditions, positive increase will not affect classification in this instance.

7. Required Labelling

The following labels were present on the product.

1. Warning Label – Hazard Symbol
2. Explanatory Label – Detailing Class, Warning Text, Standard for Classification, Output Power, Mode, & Wavelength(s).
3. Aperture Label – Affixed in proximity of where laser light exits the enclosure.

Labelling placement on both variants shown below:



Front and Rear Views of the CUBE2

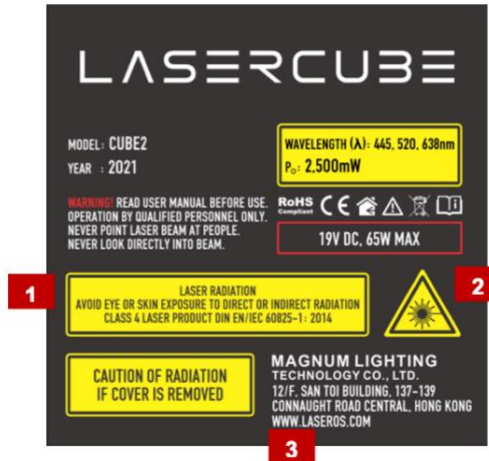


Front and Rear Views of the CUBE2 PRO

8. User Information

1. Copy of the 23-page user manual received (CUBE2-manual-20210326.pdf).
2. Laser device specifications, user warnings, and instruction on assembly and use were included.
3. Reproductions of all the labels are provided, detailing their position on the device and the output aperture position. An excerpt from the user manual is included below:

4. Product Labeling and Placement



1. Explanatory
2. Hazard Warning Symbol
3. Manufacturer's Identification
4. Laser Aperture

Protective Housing Label
(Appears on underside of housing)



Aperture Label
(Appears in front above aperture)



Label Placement

NOTE: The manufacture must ensure that laser classification of this product is present on any promotional material, such as brochures, websites etc., and that any distributors or sales representatives, for instance, are advised of this and the appropriate warnings for safe use.