lightSTUDIO

A LIGHT BOX TO ILLUMINATE A SCENE WITH DIFFERENT LIGHT TYPES

Image Engineering
modular lightSTUDIO

MODULAR LIGHTSTUDIO

Test charts are used to test digital cameras and to perform objective measurements. But there are certain aspects in testing a camera that require a real scene. One of these aspects is the correct white balancing for different types of illuminants.
Another aspect might be the determination of the visual loss of detail due to noise reduction or the amount of noise in an image. You can do tests with real scenes for yourself, but can these tests be made comparable over time? Or between different work groups when they are located in different parts of the world?
Image Engineering has developed the lightSTUDIO to make this possible. It allows the remote control and the dimming of the lights from a PC using a USB interface. In order to get a world-wide comparison between labs, the lightSTUDIO comes with the entire interior as shown in the pictures below. Each object was carefully chosen based on our experience in camera testing and can provide interesting information about a camera system. By taking pictures under different illuminants, the white balance and exposure can be checked. Reducing the amount of light to low levels enables the performance test of cameras under low light conditions. Exposure as well as noise performance and reduction and color fidelity are aspects that may be affected in such light levels and can be evaluated by analyzing the different objects in the scene.

The ColorChecker is suitable for checking the color reproduction as well as the white balance. Objects like the colored wool are used to determine the resolution for different colors and the loss of detail due to noise reduction at low light or high sensitivity levels. The portrait of the three ladies is to judge the skin tones. The newspaper that is actually reproduced on archival paper to prevent it from changing over time, is used to visualize sharpening and detail reproduction. Sometimes textile structures reflect parts of the infrared light and if the camera is still sensitive in that range of the electromagnetic spectrum, a gray piece of cloth like the one in the lightSTUDIO can turn magenta.

Together with its options for high dynamic range and moving test targets, the lightSTUDIO is suitable for all aspects of image quality evaluation.
The lightSTUDIO with its interior objects and the switchable light sources has developed into one of our top selling products.
It is well on the way to becoming the industry standard for a camera test scene. With the standard light head, it is illuminated with 6 different light sources at adjustable light levels.
With the modular lightSTUDIO we offer a test solution with two different illumination systems that are flexible, multifunctional and reproducible. The HDR and moving options enable tests under high dynamic ranges and with moving objects.

BASIC lightSTUDIO

Available with LED lightHEAD on request.

HDR lightSTUDIO

Available with BASIC lightHEAD or LED lightHEAD.

MOVING lightSTUDIO

Available with BASIC lightHEAD or LED lightHEAD.

HDR and MOVING lightSTUDIO

Available with BASIC lightHEAD or LED lightHEAD.

LED lightHEAD option

The lightHEAD of the basic lightSTUDIO can be exchanged for an LED based one that uses 20 narrow band LED channels and 2 white LED channels to spectrally match almost every standard light source. The LEDs are combined to units of 80 LEDs on a 10 x 10 cm area and 10 of these are combined to form the larger light source. One fluorescent tube is also added to get the spiky spectrum characteristic for these sources.
With the LED lightHEAD option a calibrated spectroradiometer is inserted in the bottom of the lightSTUDIO to measure the spectral distribution of the light and provide feedback to the control software. The 1000 linear intensity steps for each color channel ensure a wide selectable intensity range. Spectral distributions can be changed with a frequency of up to 40 Hz and the LED source ensures a long life and reliable reproducibility of spectra and intensities.

HDR option

Another aspect that is important for modern digital cameras is the ability to capture high contrast scenes. In order to really create a high contrast scene it is necessary to add some back illuminated test patterns or images to the box.
Two LG2 light boxes with transparent charts are used for this purpose. In order to avoid stray light, which reduces the contrast in the foreground, the light boxes are placed in the back of a surrounding black box. This box is inserted in the center part of the back wall of the lightSTUDIO. In combination with a dimmed foreground, contrast ratios of more than 10.000:1 can be reached. This makes the lightSTUDIO the ideal device to reproduce the simulation of backlighted high contrast scenes like photographing a room with a bright window.

Moving targets option (with rack)

Most devices nowadays feature still photography and video functionality. In order to compare compression technologies, artifacts, motion blur and other aspects in videos, the lightSTUDIO can be equipped with moving targets. One of these is a horizontally moving frame that can hold a variety of test charts including one with dead leaves or a slanted edge. Desired charts can be selected prior to the order. The speed of the motion is adjustable up to 3 m/s.
A second movable section is a rotating plate on the back wall of the box, which also allows for adjusting the speed (up to 600 rpm). It can carry a sector chart or any kind of custom chart. In order to stabilize the whole setup with its moving parts the option for moving targets also comes with a rack, on which the box is mounted. Translation and rotation speeds and timings can freely be programmed using the control software. Please also have a look at the product information on our website.

Software

A software is used to control the motion and the illumination of the lightSTUDIO as well as the camera and the signal analysis.
It allows to create, store and reload predefined test procedures. The controllable characteristics are modified on a programmable timeline. The user can define when a motion or a change in the illumination starts, how fast it is and when it ends. For the scene illumination, the spectral distribution (with LED lightHEAD) and the intensity can be controlled. For the HDR background, the intensity can be adjusted. For the spectral distribution, the closed loop feedback of a spectroradiometer is used and displayed. The beginning of a test procedure also starts a timer that will be visible in the images and - at pre-selectable times - a recording signal can be sent to the camera directly or the DIGITUS can press the exposure button. Depending on the setup the video will be recorded onto a recording media in the camera or onto the hard drive in the computer. An analysis section in the software evaluates the videos for resolution, artifacts and adaptation time to lighting conditions. We are certain that this software will become the market's leading analysis tool for motion picture image quality.

TECHNICAL SPECIFICATIONS

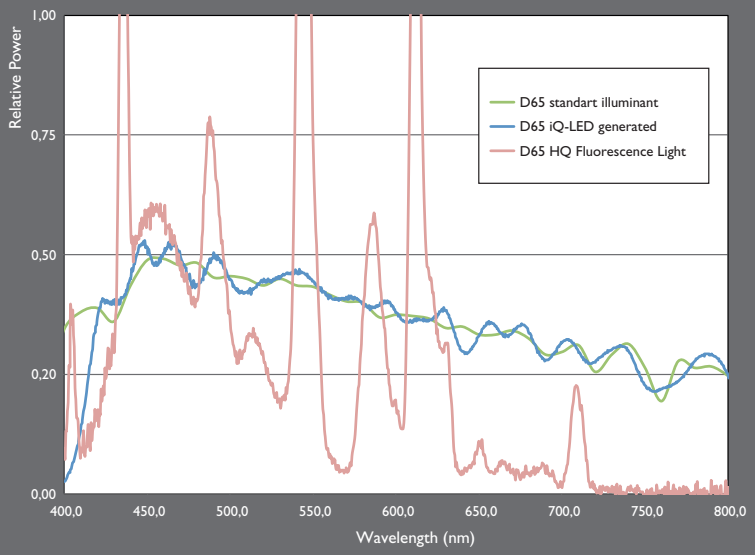
BOX	BASIC LIGHTSTUDIO	HDR LIGHTSTUDIO	MOVING LIGHTSTUDIO	HDR and MOVING LIGHTSTUDIO
Article name	lightSTUDIO-S	lightSTUDIO-LH	lightSTUDIO-LM	lightSTUDIO-LMH
Supply voltage	220 – 240 V, 50/60 Hz	220 – 240 V, 50/60 Hz	220 – 240 V, 50/60 Hz	220 – 240 V, 50/60 Hz
Outer dimension (w / h / d)	130 x 80 x 80 cm	130 x 80 x 127 cm	232 x 192 x 82 cm	232 x 192 x 128 cm
Inner dimension bottom plate w x d	125 x 75 cm	125 x 75 cm	125 x 75 cm	125 x 75 cm
Height of the area for a test scene	60 cm	60 cm	75 cm	75 cm
Weight	ca. 45 kg	67 kg	134 kg	156 kg
Power consumption	max. 200 VA	max. 400 VA	max. 600 VA	max. 800 VA
USB interface	USB 1.1	USB 2.0	USB 2.0	USB 2.0

BASIC LIGHTHEAD			
Illumination type	Color temperature, ca. [Kelvin]	max. light level [Lux]	
F12	2800	≥ 1600	dimmable
F11	3800	≥ 1600	dimmable
D50	5000	≥ 1600	dimmable
D65	6500	≥ 1600	dimmable
Halogen 10 lx	2100	10	dimmable
Halogen 100 lx	2800	100	dimmable
Halogen 400 lx	3100	≥ 400	dimmable
Halogen 400 lx with blue filter	10000	≥ 400	dimmable

TYPE OF LAMPS		
Illumination type	Type of lamp	Quantity
Halogen bulb	NV Halogen Lamp 20 W 12 V MEGA IRC, GU5,3 other types can be used if they satisfy the following requirements: 12V, 20W, socket GU5.3, emitting angle 60°, with safety glass and cool beam technology	14
F12	OSRAM L 36W/930, or other 36W with CRI (color rendering index) of >90 and color temperature of 2800-3000 K	2
F11	OSRAM L 36W/940, or other 36W with CRI of >90 and color temperature of 3800-4000 K	2
D50	OSRAM L 36W/950, or other 36W with CRI of >90 and color temperature of 5000 K	2
D65	OSRAM L 36W/965 or other 36W with CRI of >90 and color temperature of 6500 K	2

LED LIGHTHEAD	
Light source	10 x iQ-LED: 800 LEDs, 22 channels (20 color, 2 white) / 1000 step control / 32 kHz PWM / Spectral range: 400 – 820 nm / approx. lifetime of 10.000 h
Predefined standard illuminants	D50, D55, D65, D75, 3200(BB), A, B, C, F2, F11, F12 (curve fit of 97% / CRI > 97 for most of them, see complete datasheet for detailed information)
Illumination stability	+/- 2%
Maximum / Minimum illumination values	max. up to 600 lx / min. down to 25 lx, depending on illuminant
Power supply	220 - 240 V, 200 W
Dimension (w / h / d)	130 x 80 x 18 cm
Weight	ca. 25 kg
Scope of delivery	lightHEAD (10 x iQ-LED, internal mini spectrometer), power cord, USB cable, control software

HDR EXTENSION	
Principle	Super Black Hole with two LG2-D as a light source
Illumination type	2 x (4 x 24 W) fluorescent U-tubes. OSRAM DULUX L 24 W/954
Color temperature	app. 4700 K +/- 200 K
Dimmable	3 … 100% of max. illumination. Controllable from PC
MOVING EXTENSION	
Horizontal movement:	
minimum speed	1 mm / s
maximum speed	3 m / s
Rotating disk:	
minimum	0.5 rpm
maximum	360 rpm



Comparison of D65 spectra: HQ Fluorescence and iQ-LED

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