TechnoTeam
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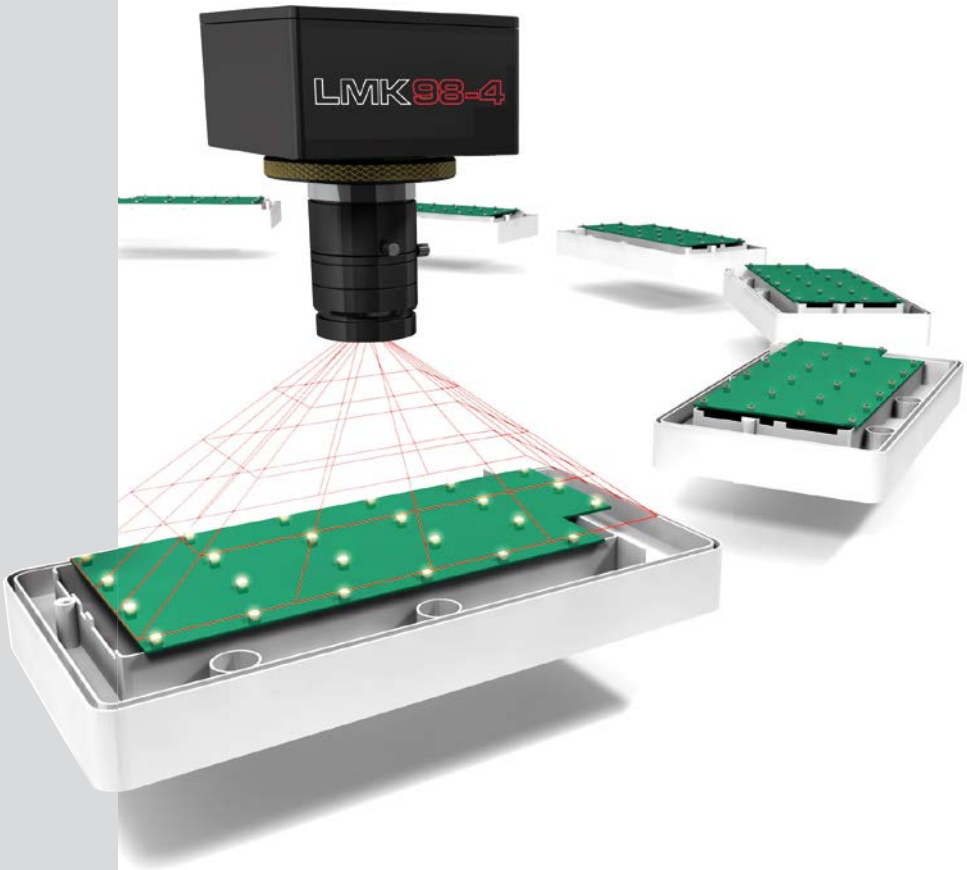


CHECKER

production accompanying measuring technique for LED and LED assembly groups

IPED

LED checker

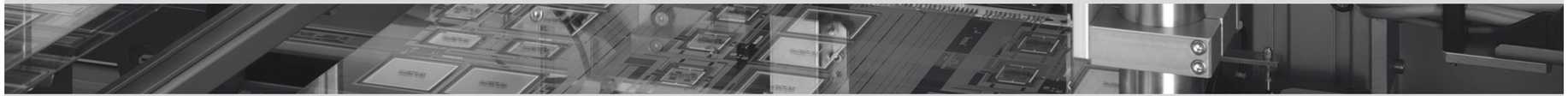
LEDs are becoming increasingly important in different fields of architectural illumination, for lighting fixtures and for the automotive industry. Because they are small and easy to combine, LED assembly groups are used very often. There are practically no restrictions concerning their design, so many different arrangements are possible.

To get photometric data of the LEDs, a well adaptable measuring system is necessary. It must be able to capture high dynamic images for different areas of color spaces as well as for different light intensities/ luminances. Moreover, it is possible to determine intensity gradients and also the uniformity of light sources for both assemblies and Single-LED symbols.

All this information can be determined by means of an imaging photometer or imaging colorimeter within fractions of a second.

In addition, there are image-processing operations specially adapted to these problems. For example LEDs in the picture can be detected and separated automatically.

LED checker
IPED



Technical data

Sensor:
CCD - imaging matrix system

Standard resolution
1380 x 1030 pixel
Higher resolution
2448 x 2050 pixel
4008 x 2672 pixel
4008 x 4008 pixel

With several lenses any field of view can be realized.

Resolution (dynamic): 1:1100 (~ 61 dB)
Single picture measurement: 1:3600 (~ 71 dB)
Multi picture measurement: 1:10000000 (~140 dB)
High Dynamic measurement: 12/14 Bit
A/D conversion:

Measuring range:
Setting the luminance measuring ranges by choosing the integration time from 100 µs...15 s.

Measuring range depending on lens (aperture value = k), e.g.:
1ms ... appr.1800 cd/m² & 3s ... appr. 0.6 cd/m² (k = min.)
1ms ... 60000 cd/m² & 3s ... appr. 20 cd/m² (k = max.)

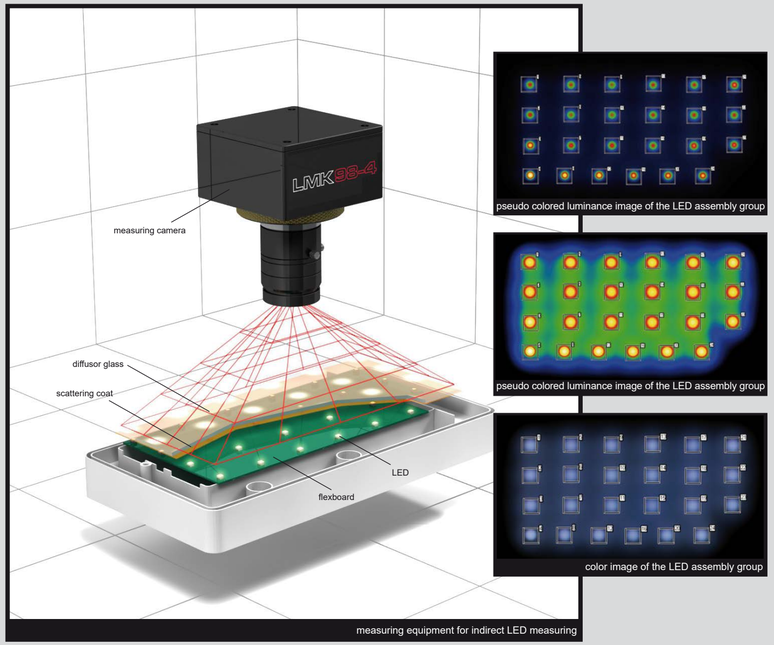
Higher luminances can be achieved by using optional ND grey filters.

Measurement time:
down to a few milliseconds

Photometrical measuring data:
Camera RGB; Camera rg; L; Lxy; XYZ; dom. wavelength

Geometrical measuring data:
position, distance, squint

Measuring principle




final luminary (with original cover and emergency sign)


daytime running light


rear light

Measuring principle

Depending on the specific application, LEDs can be measured either directly or indirectly. The measuring principle for the indirect measurement is shown in the central figure. Here, a diffusing screen is mounted at a suitable distance to the LED assembly. The luminance and chromaticity coordinates can then be measured on this screen.

There are applications just as emergency lights, where especially the single results of each LED compared with one another are of interest. So, it has to be checked whether all LEDs have a minimum of intensity (luminance) and also that the color distance between the LEDs is within a predefined tolerance.

The luminance distribution of the single LEDs contains some important information:

- The luminance and the size of the light spot provides information about the partial luminous flux.
- From the coordinates of the “light spot”, both the position of the LED or also a certain “squint” of the LED can be concluded.

The use of a color camera does not only permit the brightness to be measured, but also the color in an imaging manner:

- color differences occurring within the radiation of a single LED can be detected (e.g. in the case of white LEDs)

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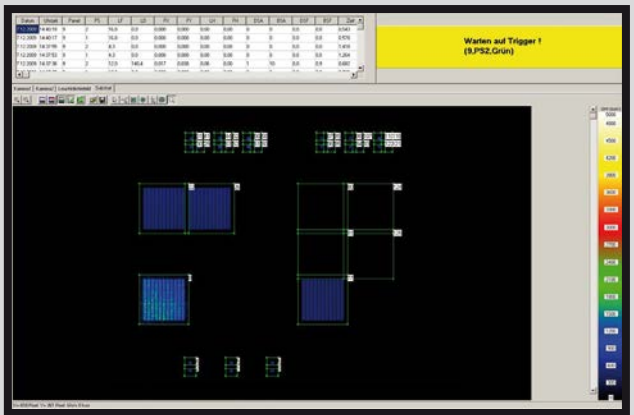
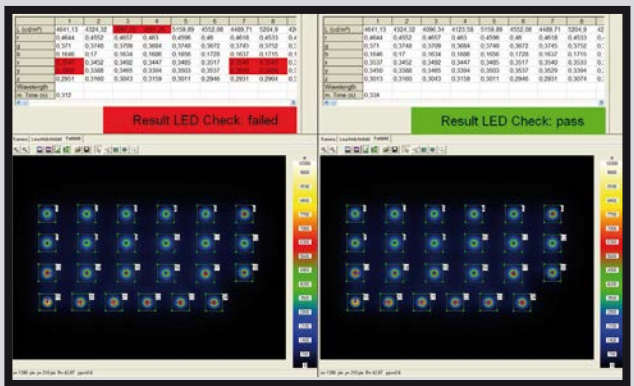
Software client

The LED Checker package contains also several interfaces for the communication with a process control system.

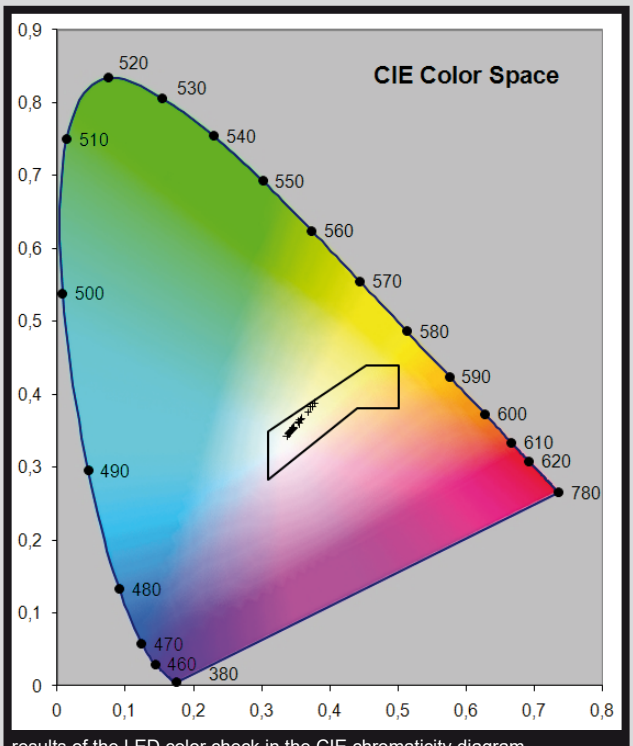
Results represented in the software user interface or the data can be optionally transferred to external protocol files and programs.



communication of the process control system with the LED Checker



example for a failed (left) and a passed (right) LED check



results of the LED color check in the CIE chromaticity diagram

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