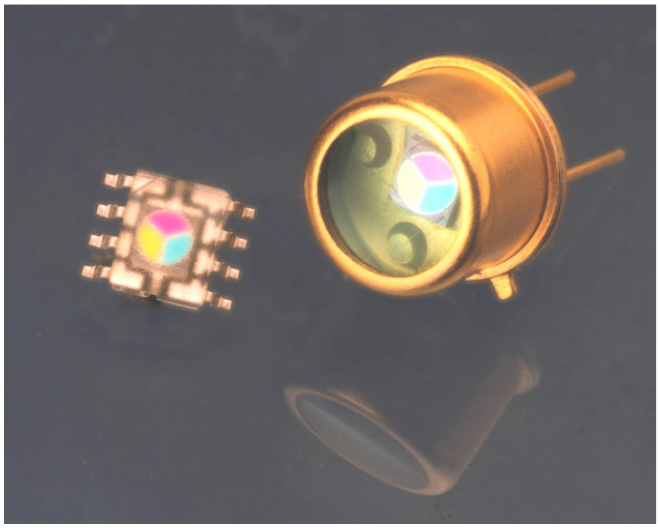
Rapid Color recognition with compact 3-element Color sensor

PRODUCT INFORMATION



The industrial Color recognition and checking becomes easier. For low-scale applications with high dynamics the MAZeT Color sensors are a preferable choice. Three areas each of different Color are responsible for the recognition - similar to human's eye. A small design, high-quality filters and the synchronous recording of all three-Color ranges feature Color sensors by MAZeT. Furthermore the circular alignment of the diodes allows simple coupling of the measurement signal using an optical fibre.

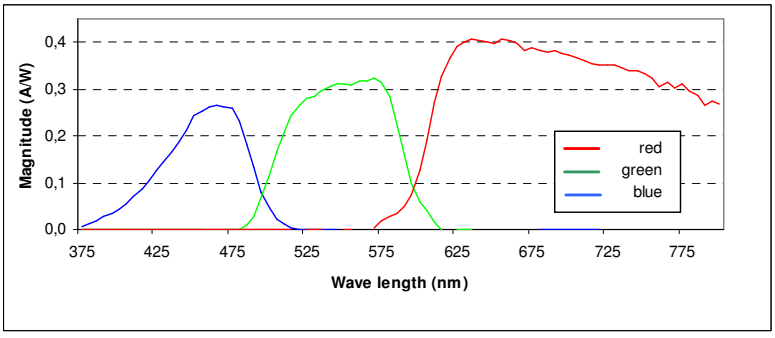
• Principal assembly

The Color sensors are made of 3 Si-PIN photo diodes integrated on chip. They are carried out as segments of a ring with the diameter of 2,0 mm. The design as Si-PIN photo diodes allows signal frequencies up to MHz-range. In order to achieve a small cross talk between the photodiodes the individual sectors have been separated from each other by additional structures. Each of these photodiodes is sensitized with dielectric spectral filter for its Color range, preferably for the primary Colors red, green and blue.

The sensors are offered as default in the TO5 carrier with translucent plastic or cover glass, IR-blocking or optics, and/or in the SOP8 with translucent plastic. Other packages can be delivered custom-specifically on customer request.

• High-quality Color filter

Typical spectral sensitivity of the 3-element Color sensor MCS3 sensors use dielectric spectral filters (example see figure). These are located directly upon the photodiodes. Therefore the sensor forms a compact optical system.



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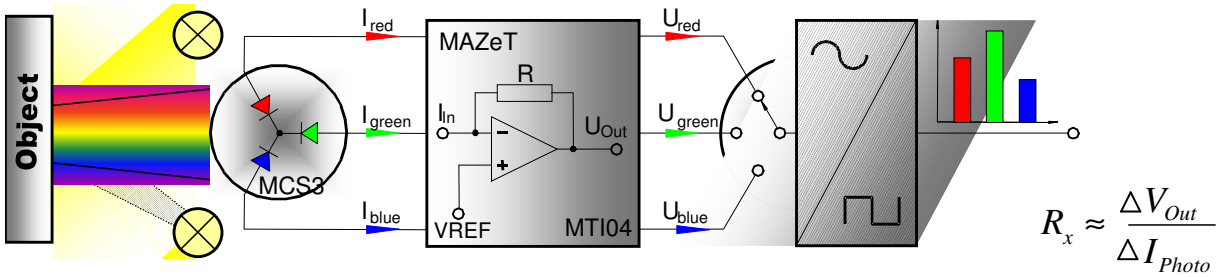
Because the filters reflect the light in the locked Color range, they have a considerably better aging resistance than spectral filters based on the absorption principal. Furthermore, dielectric filters guarantee a high temperature stability and environmental resistance. In this way, they are also suitable for the applications under harsh environmental conditions. Because of their construction as a multiple layer system, different functions can be realized with these filters. More specific, there is a possibility for special applications (e.g. limitation to a small Color gamut) to modify the spectral characteristic curve of the spectral filters.

• Signal processing

At the sensors, the anodes and the common cathode are available as contacts of the individual Color ranges. The photocurrent can be amplified and transformed by simple amplifying, comparable with a traditional photodiode.



The figure shows the basic building blocks of a Color detection system based on the MCS3. The measurement object is illuminated with a white source of light. The Color sensor detects the reflected light for the three-Color ranges red, green and blue. By using a multi-channel transimpedance amplifier the photocurrent are converted into an equivalent voltage. The output voltage range can be adjusted to the measured photocurrent by choosing suitable resistors (e.g. pin-programmable transimpedance amplifier MTI04 with the resistors 25kΩ, 500kΩ and 5MΩ). Then an A/D converter for further digital signal processing may digitize voltages.

• Advantages

Unlike other methods of measurement, three field Color sensors require only 3 measured values. These are detected simultaneously for determining the Color. As a result, the three field sensors allow the low-cost and fast signal processing.

By direct mounting of the spectral filters onto the photodiodes, the MCS3 is a compact sensor element. As a result, measuring systems based on the MCS3 can be sized considerably smaller than traditional Color measuring instruments.

Color measurement technologies often use LED-measuring systems. Different colored LED's illuminates the object of measurement in sequence. In comparison to other sensors the Color sensor MSC3 measures all three Colors simultaneously. It is useful for specific applications, e.g. in case of moving objects or other time-critical measurements.

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