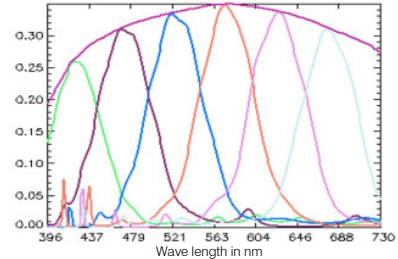
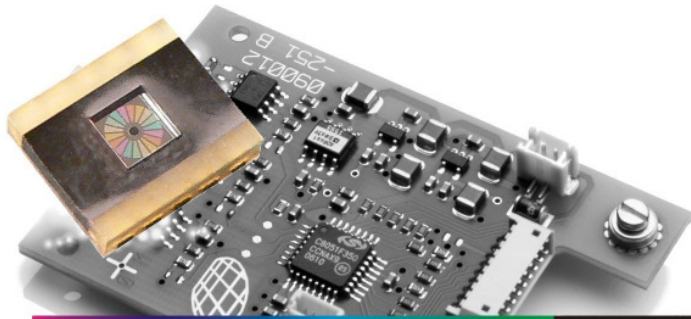


Pre-announcement

JENCOLOR Multiple Color Sensor Solutions for Spectral Measurement

Preliminary
PRODUCT INFORMATION



**Fast color measurement and
spectral analysis as handheld,
standalone and in-line solution in
emission, remission and transmission**

The Sensor IC MMCS6 is based on the well-proven technologies of the compact and price/performance-optimized JENCOLOR semiconductor sensors. With 7 spectral bands in the VIS range (380-780 nm), the sensor performs spectral analysis and color measurement.

A color is not evaluated on the colorimetric level, but at the radiometric level. This establishes the spectrum of a color, which is used to precisely calculate the chromaticity. This has the advantage that significantly more information is produced with respect to the color measurement.

This spectral sensor provides the advantage that metamerism effects are filtered out, which is not possible when using colorimetric sensors.

Light-sensitive detectors and on-chip interference filters are integrated within the Sensor IC MMCS6 in a compact SMD sensor housing. The sensor does not manifest any aging effects and has both long term and temperature stability.

The spectral bands of the Sensor IC MMCS6 are optimized to achieve high measuring accuracy irrespective of the quality of the light sources. The spectral approximation of the measured colors enables colors to be measured with a high degree of precision that cannot be achieved with the human eye. The sensor is suitable both for fast in-line measurements as well as rugged handheld applications.

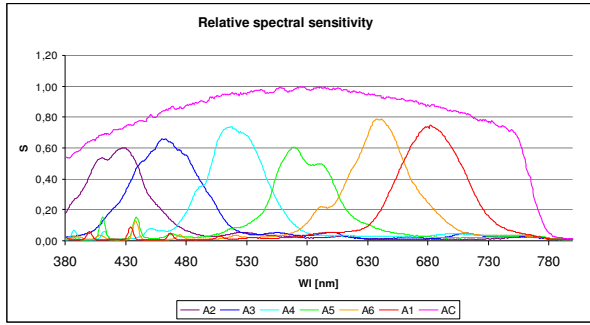
MAZeT develops and supplies application-specific and customized OEM hardware and software solutions based on the Sensor IC MMCS6 and modules.

Highlights

- Color measurement based on spectral evaluation and selective spectral analysis
- Spectral value output
- Calibration in the Lab/Luv system
- High absolute accuracy
e.g. $\Delta E_{\text{mean}}=0.43$; RAL classic; LED white peak=450 nm & high repeat accuracy <0.5 %
- Low dark currents
- Signal input frequency >100 kHz
- SMD chip, 7x6x1.7 mm
- JENCOLOR software library, test boards and source development kits available
- Supplied as PCB, can be adapted to specific customer requirements

Preliminary
Product Information
JENCOLOR Multiple Color Sensor Solutions for Spectral Measurement

MAZeT offers diverse amplifier ICs, test boards and a software library with driver software and routines as OEM components for calculating and correcting systems and sensors, as well as for colorimetric and analytical purposes. Using simulation tools, the optical parameters, energy concept, amplifier variants, converters and measuring accuracy can be calculated before the design and test phases. Sensor boards and function/driver software (plug and play), adapted to the particular application, support the system and application tests, including correction and calibration. If required during the design phase, the form factor of the sensor boards can be optimized on an OEM basis or adapted with regards to the resolution, controller and interface. MAZeT supplies the entire colorimetric solution from a single source. This extends from the simulation, test, calibration and design to series production and support.



Spectral sensitivity of the Multiple Color Sensor

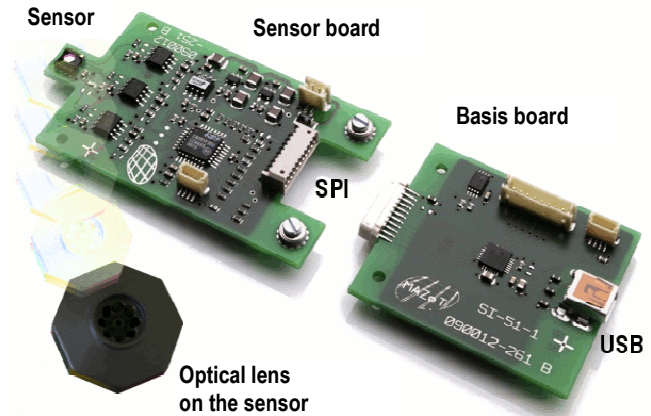
| | | |
|---|--------------------------|----------------------------------|
| Spectral sensitivity | 0.2...0.4A/W | $\lambda_{pA1} = 690 \text{ nm}$ |
| Sensor area A1..A6/AC | 0.31/0.07mm ² | $\lambda_{pA2} = 430 \text{ nm}$ |
| Sensor diameter | 2mm | $\lambda_{pA3} = 470 \text{ nm}$ |
| $\Delta\lambda(\lambda)$ spectral tolerance | < 1%* λ nm | $\lambda_{pA4} = 520 \text{ nm}$ |
| | | $\lambda_{pA5} = 570 \text{ nm}$ |
| | | $\lambda_{pA6} = 640 \text{ nm}$ |
| | | $\lambda_{pAC} = 590 \text{ nm}$ |

Characteristic values of the Multiple Color Sensor

MMCS Test and Design Components

1. JENCOLOR SW Library

| Components | Contents |
|---------------------|--------------------------------|
| Hardware-DLL | Driver interface(s) |
| CALL BACK functions | Reference hardware and library |
| Basic Library | Colorimetric functions |
| Advanced Library | Calibration, correction |
| Application Library | e.g. closed-loop control |



2. Evaluation Boards

| Component | Sensor board MMCS-HR8 | Sensor board MTCS-HR11 |
|-------------------------|---|---|
| Basis board | C8051F321 (8 bits, 25 MIPS), sensor interface: I2C, SPI, communication: USB | |
| Test software | USB driver, monitor program incl. Excel report, support of various functions such as calibration, test | |
| Amplification principle | Current-voltage conversion using the MAZeT MT104C (see 1.), discrete integration (summing) | Current-charge conversion using the TI DDC114, continuous integration ($[I_{on}] = fA \cdot \mu A$) |
| AD conversion/ μC | 16 bit ADC in the μC / C8051F065 (8 bits, 25 MIPS) | 20 bits in the amplifier / STM32F101xB (32 bits, 40 DMIPS) |
| Measurement frequency | approx. 10,000 ... 20,000 SPS | approx. 1 ... 2,500 SPS |
| Interface | I2C, SPI, I/O, LED control, debug | |
| Accessories | LED board (for max. 4 LEDs), optical lens to maintain the measurement geometry 0° sensor / 45° LED illumination | |

3. Sensor signal amplifier

| Function | MT104Cx | MT108D |
|------------------------|---|---|
| | 4-channel amplifier with current-voltage conversion | |
| Trans-impedance | 25 kOhm – 20 MOhm in 8 steps | 250 kOhm – 25.6 MOhm in 8 steps |
| Input current | 25 nA – 20 μA in 8 steps | 20 nA – 2.56 μA in 8 steps |
| Operating frequency | 6 kHz – 300 kHz in 8 steps | 9 kHz - 155 kHz in 8 steps |
| Components on the chip | I/V converter, chip-programmable, power-down | I/V converter, S&H, MUX, power-down, can be programmed via I2C channel-by-channel |
| Output signal | Voltage (V1...V6, VC) = reference – (input current * trans-impedance) | Voltage (V1...V6, VC) = reference – (input current * trans-impedance) // S&H MUX |

You can obtain additional information from our website at <http://www.JENCOLOR.de> or from our sales offices!