REVISIONS		
REV.	DESCRIPTION	APPROVED
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DATA-SHEET

MCS3AS

3-element color sensor – SMD/SO8

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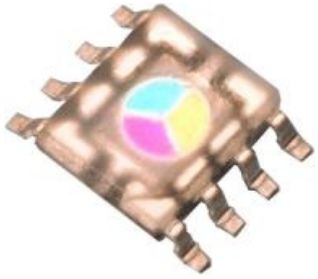
1. FUNCTION

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.

2. APPLICATION

- Quality control
- Monitoring the production
- Control of manufacturing
- Detection of color marks



3. FEATURES

Dielectric filters guarantee the good optical properties of the color sensors, such as:

- high transmission
- no aging of the filter
- high temperature stability
- high signal frequency
- reduced cross talk
- small size (diameter of the optical sensitive

  surface ca. 2 mm)

4. CONSTRUCTION

- 3 on chip integrated PIN photo diodes
- dielectric filters for the three color ranges: red, green and blue
- package design SOP8
- Electrical connections
  - three anodes
  - one separated diode for minimization of the cross-talk
  - one common cathode

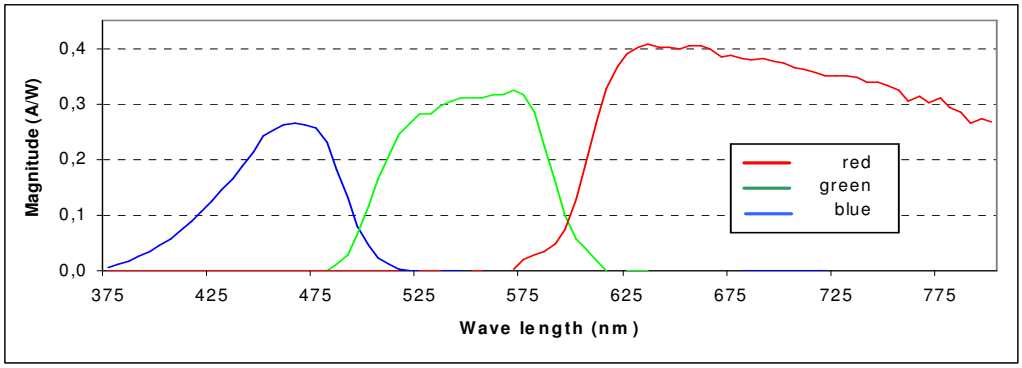
5. MAXIMUM RATINGS / CHARACTERISTICS

(TA = 25°C; per single diode)

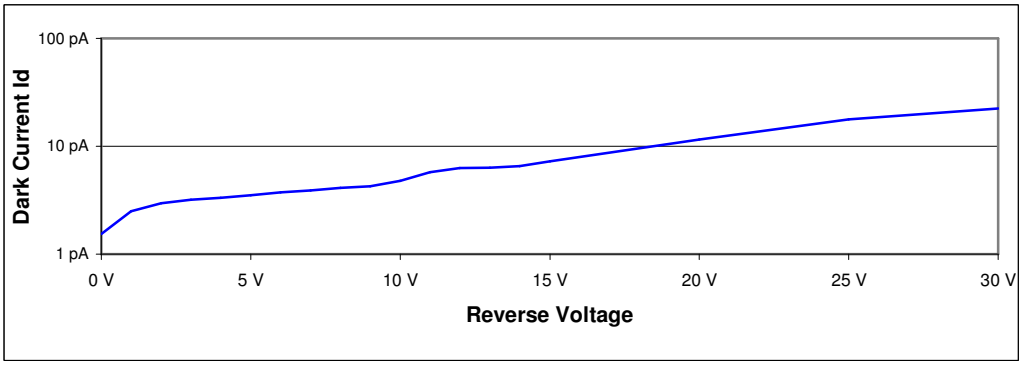
Description	Symbol	Condition	typ. Value	Unit
Diameter of the light sensitivity area	D		2,0	mm
Light sensitivity area per element	A		0,85	mm^2
Photo sensitivity of the color ranges	S_{max}	λ_B = 470 nm λ_G = 570 nm λ_R = 650 nm	0,26 0,33 0,41	A/W
Field of the spectral sensitivity ± 2%*λ	λ_B λ_G λ_R		400 - 510 490 - 610 590 - 750	nm
Rise and fall time of the photo-current	t_r, t_f		<1	µs
Noise equivalent power	NEP	f_R = 100Hz	$<10^{-13}$	W/√Hz
Cross talk			1	%
Angle of incidence	φ	$\Delta\lambda_{(Filter)} < 1\%*\lambda$	8	Grad
Operating temperature range	T_{op}		0 ... +70	°C
Storage temperature range	T_{st}		-20 ... +80	°C
MSL (Moisture Sensitivity Level)		-	1	-
Soldering temperature	T	2…3 sec	240	°C
Reference voltage (see also chapter 9 Application Circuit)	VREF		0,4 … VDD-0,4	V
Reverse voltage	V_r		0…5	V

6. CHARACTERISTIC CURVES

6.1 Typical spectral sensitivity[1]

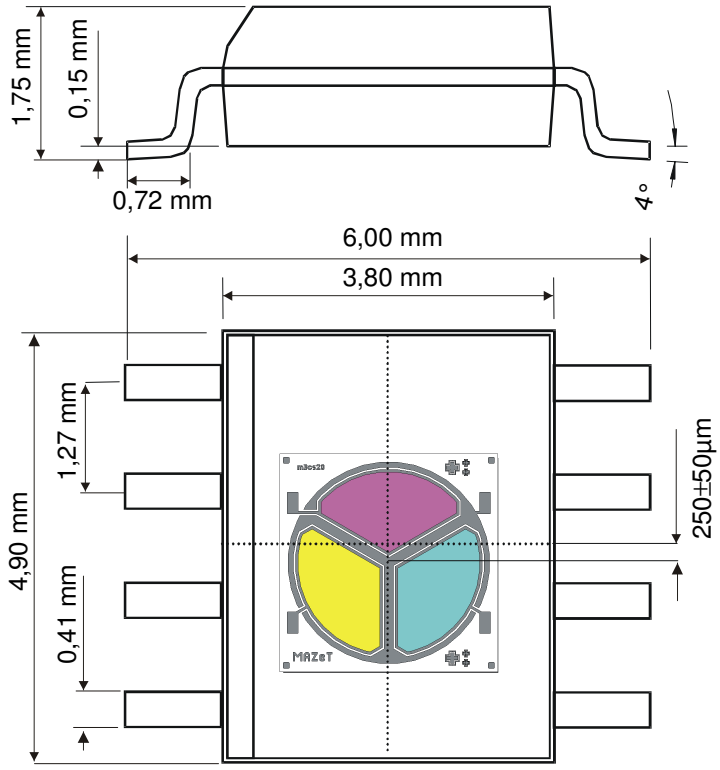


6.2 Dark current



[1] Typical characteristic sensitivity; scanned by monochromatic light with FWHM 27nm, not suitable for narrow light, e.g. laser

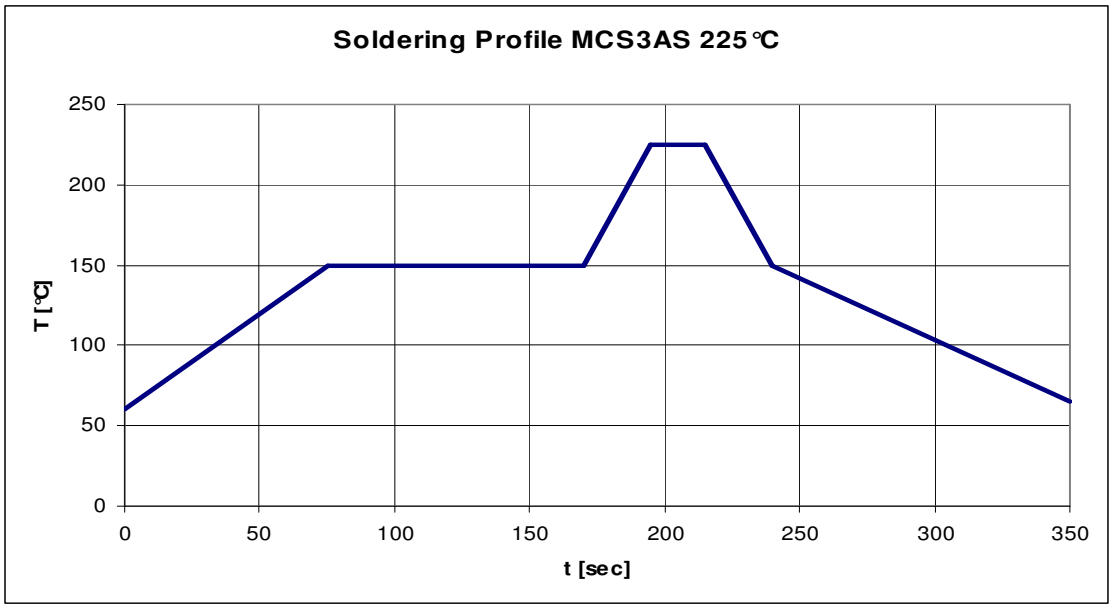
7. PACKAGE OVERVIEW



SOP8 Package (MCS3AS)

∅ diodes 2mm

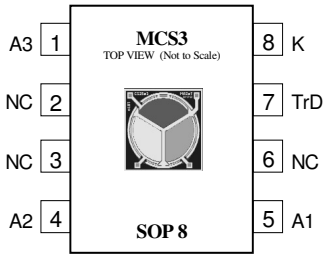
8. SOLDERING PROFILE



9. PIN-CONFIGURATION

(Top view)

PIN	description
1	A3 green
2	nc
3	nc
4	A2 blue
5	A1 red
6	nc
7	TrD[2]
8	K common cathode

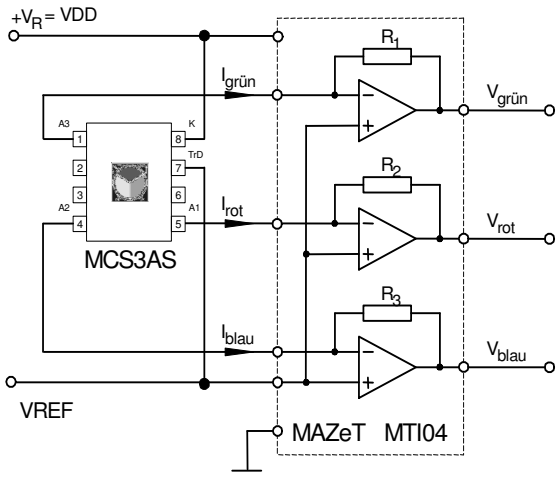


SOP8- package

10. APPLICATION CIRCUIT

Opposite figure shows a circuit for the conversion of photo current to an equivalent voltage. These voltage can be processed e.g. with an ADC. By the selection of suitable resistors the output voltage range can be adjusted to the photo current value. (for example the pin-programmable transimpedance amplifier MTI04 with the resistors 25kΩ, 500kΩ and 5MΩ)

$$R_x \approx \frac{\Delta V_{Out}}{\Delta I_{Photo}}$$



11. APPLICATION NOTE

It is recommended to use a light source with low infrared radiation for optimal operations of the color sensor.

[2] TrD is a isolation diode to split up the potential of the 3 functional PIN diodes. It's important for shielding the single color diodes to minimize cross-talk among the 3 colored areas/diodes. In general the TrD has to be connected with the Vref or in the case of MAZeTs MTI04C-amplifier with the 4th channel of it).

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12. ORDERING INFORMATION

Color sensor MCS3 with SOP8-package + transparent encapsulated (plastic)	**MCS3AS**
Evaluation board for JENCOLOR sensors	**MCS-EB1**

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