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## Application Note

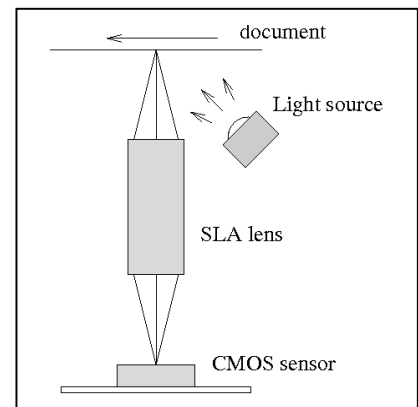
# Components for OCR card readers

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For OCR (OCR = Optical Character Recognition) or other scanning applications EURECA Messtechnik provides combinations of special optics and suitable CMOS linear sensors.

In contrast to other suppliers we provide however no complete reading systems, but focus on the main components. The integration of these components into the final system is up to the customer, which leads to the best price/performance ratio of the end product.

We support you with selecting the most suitable components, the development, the design of prototypes and supply finally the needed components for serial production in every volume "just in time".



The figure above shows the principle design of an OCR card reader, which operates like a scanner. The image of the document to be scanned is projected onto a CMOS linear sensor by a linear lens array. So every time only one line of the document is read by the sensor, which converts the brightness for each point on this line into a proportional electrical signal. By moving the document across the reading unit the, complete document can be scanned.

Illumination is made by LEDs or other lighting sources at the side of the linear lens array. By using respective light sources, the system can be optimized for detecting certain features on the document. Scanning the document in full colour is possible by e.g. using red, green and blue LEDs.

The sensor as well as the document have to be aligned in a certain distance to the linear lens. This so called working distance has to be adjusted as good as possible, in order to get a sharp image. For this, the document can e.g. be put onto a glass plate. In this case the working distance is adjusted to the front glass surface.

For details about the available linear lenses and CMOS image sensors please refer to the next page.

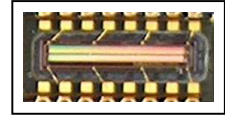
With the available components very compact reader units can be constructed. The document can be scanned with a resolution between 200dpi and 600dpi. Up to 30 lines per second can be achieved. The available components are not very expensive, and available in smaller volumes from stock. Some sensors can also be delivered with an extended temperature range. With this feature reader units for outdoor applications can be constructed.

Possible applications for OCR reader units are (among other):

- **Card reading devices** e.g. for reading text on Eurocheck cards
- **Dokument scanners** e.g. for identifying security features on bank notes
- **Scanners for mobile phones** e.g. for scanning text lines from a book page
- **Barcode reading devices** e.g. for identifying products in production

## Suitable CMOS linear sensors for OCR readers

As CMOS linear sensors we can supply many different types from several manufacturers. The scanning length of these sensors vary between 3,9mm and 8,2mm, which is e.g. ideal for scanning a text line on a book page or on an Eurocheck card. CMOS linear sensors are easy to use, since they need only one supply voltage and a few clock lines.



The sensors generate for each pixel an analogue output voltage, which is proportional to the brightness of the respective point of the document. This output voltage can easily be converted into a digital datastream using standard micro controllers with integrated ADCs.

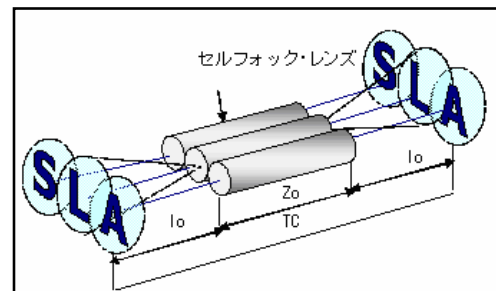
Designation	Pixel number	Pixel size [ $\mu\text{m}^2$ ]	Scan width [mm]	Data rate [MHz]	Housing	Remarks
TSL1401R	128	55,5 x 63,5	8,1	8	DIP	
TSL1401CS				8	BGA	Extended temperature range
LIS-500	500	62,5 x 7,8	3,9	1	Die	Low Cost, must be bonded on pcb
LIS-1024D-LG	1024	125,0 x 7,8	8,0	20	LCC	
ELIS-1024A-LG	1024	125,0 x 7,8	8,0	30	LCC	Pixelbinning, Shutter
ELIS-1024A-BGA					BGA	Pixelbinning, Shutter Serial production starting in 2007
RPLIS-2048-LG	2048	32,0 x 4,0	8,2	2,5	LCC	Low power consumption

There are many more CCD/CMOS linear sensor available also for other applications. For a complete list please refer to our internet pages.

## Suitable SLA linear lenses for OCR readers

SLA linear lenses consist internally of a series of individual gradient lenses, which image a part of the document to the CMOS sensor. Hereby the small images of the individual lenses overlap to form a complete full size picture. Enlarging or reducing the picture is not possible with this lens type.

The lenses are available as bars in standard lengths as e.g. A3, A5 or A5. They can however also be cutted to the needed length to fit perfectly to the used CMOS sensor.



Designation	TC* [mm]	Lens rows	Width [mm]	MTF at 6LP/mm [%]		DOF** [mm]	Chromatic aberration [10E-3]
				Average	Min.		
SLA12A(HR)	43,2	2	14,04	70	45	±0,45	1,0
	43,0		13,94				
	32,1		7,89	73	50		
	32,0		7,84				
SLA20B	15,1	2	4,10	55	45	±0,3	41,0
	14,6		3,86				
	13,8		3,46				
	14,4		1				
SLA20D	9,1	1	2,40	60	50	±0,3	41,0

\* TC = Distance between document and sensor

\*\* DOF = Depth of view; indicated for a modulation transfer of 10% at 6 line pairs per millimeter.  
The indicated value is not binding and should be used only as a rough estimate.

The complete list of available linear lenses can be found again on our internet pages.

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