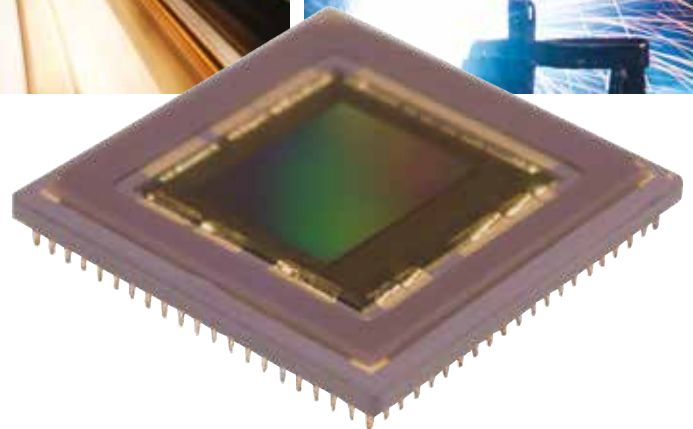




# LINCE5M

**5.2 MEGAPIXELS, 1 INCH, 250FPS,  
GLOBAL SHUTTER CMOS IMAGE SENSOR**



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## OVERVIEW

**Lince5M is a digital high speed image sensor designed for excellent performance in a large variety of applications, ranging from low noise high dynamic range surveillance to high speed high resolution machine vision.**

Lince5M incorporates a high speed 5.2Mpxl CMOS active pixel image sensor providing global electronic shutter and High Dynamic Range (HDR) features.

The sensor array utilises active CMOS pixels with pinned photodiodes to deliver high image quality whilst maintaining the size, cost, and integration advantages of CMOS process.

The pixel response can be configured for either linear light response with 58dB, or for high dynamic range piecewise linear response, with more than 100dB dynamic range; both with global shutter operation.

### **LINCE5M INCORPORATES SOPHISTICATED ON CHIP FUNCTIONS, AS:**

- **Pixel binning, windowing, and sub sampling**
- **Linear / HDR sensing**
- **FPN correction**
- **Defective pixel correction**
- **Per colour selectable analogue gain (in colour version)**
- **Per colour fine digital gain and offset**
- **Microcontroller for statistic-image-information-based sensor control**

All these functions are programmable via on chip microcontroller or standard Serial Peripheral Interface (SPI).

Lince5M includes 24 12-bit digital LVDS data outputs, each running at 691Mbps, plus 2 LVDS ports for clock recovery and image synchronisation, respectively.

Lince5M also offers a CMOS-output version, in which image data is transmitted via 48 CMOS output buffers, for those applications where LVDS receivers are not available.

The whole system runs with an external clock of 9.6MHz. All the required timing and reference voltages are internally generated, thus minimising the need for external components. It includes a power down capability for low power dissipation.

Lince5M is very versatile and can operate in a wide range of applications. Its configurability allows it to work with very high frame rates and moderate power consumption as well as with low frame rates and very small power consumption.

Lince5M offers the possibility of reducing the number of active LVDS/CMOS ports when either the frame rate or the output word length is reduced. This minimises the complexity of the required external set-up.

## KEY FEATURES\*

- 2,560 x 2,048 active pixel
- 5  $\mu\text{m}$  pixel pitch with pinned photodiode
- Optical Format: 1"
- Global shutter with programmable exposition time
- Maximum frame rate: 250 fps @ 2,560 x 2,048 in 12-bit mode
- 58 dB dynamic range (DR)
- 42 dB SNR<sub>MAX</sub>
- 0.5 % PRNU
- 50 e-/sec, 10 DN 12-bit/sec DSNU
- 63 % Fill Factor x Quantum Efficiency
- Sensitivity 13,400 DN 12-bit/(lux sec)
- 16.6 Gbit/sec throughput
- High speed data output via LVDS ports (x24) or CMOS buffers (x48)

\* Performance measured at 25°C junction temperature, analogue gain x1,  $\lambda = 550 \text{ nm}$  and  $\mu$ -lenses. Performance may degrade with temperature. Maximum recommended junction temperature is 70°C.

## APPLICATIONS

Generic high speed high resolution machine vision inspection and intelligent transportation systems.

The complete camera reference design, including fully documented PCB schematics, PCB layout, FPGA firmware and communication and control software is available for customers willing to develop new cameras using the Lince5M Image Sensor.

## PROGRAMMABILITY

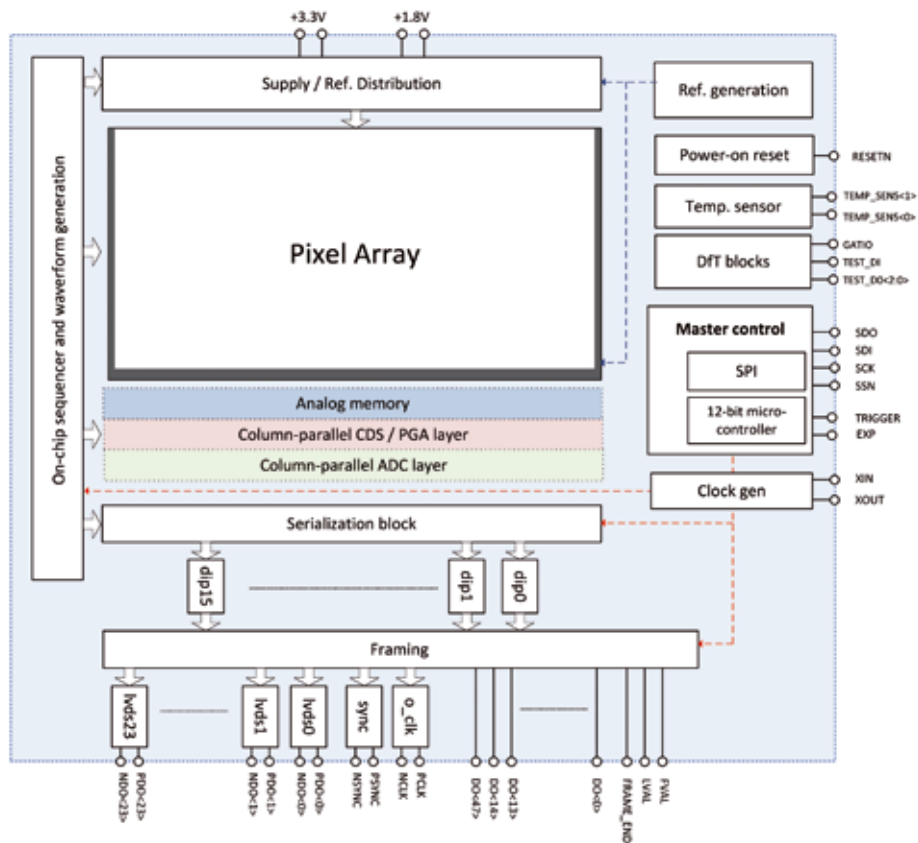
- Per colour programmable analogue-digital gain and offset
- 2x2 and 4x4 CMOS pixel binning for increased SNR & DR
- On chip vertical horizontal FPN correction
- On chip defective pixel correction
- Programmable per colour look up tables (LUT)
- 8/10/12-bit selectable digital output word length
- Selectable active LVDS ports for a given frame rate
- Sensor programming via SPI port

## MISCELLANEOUS

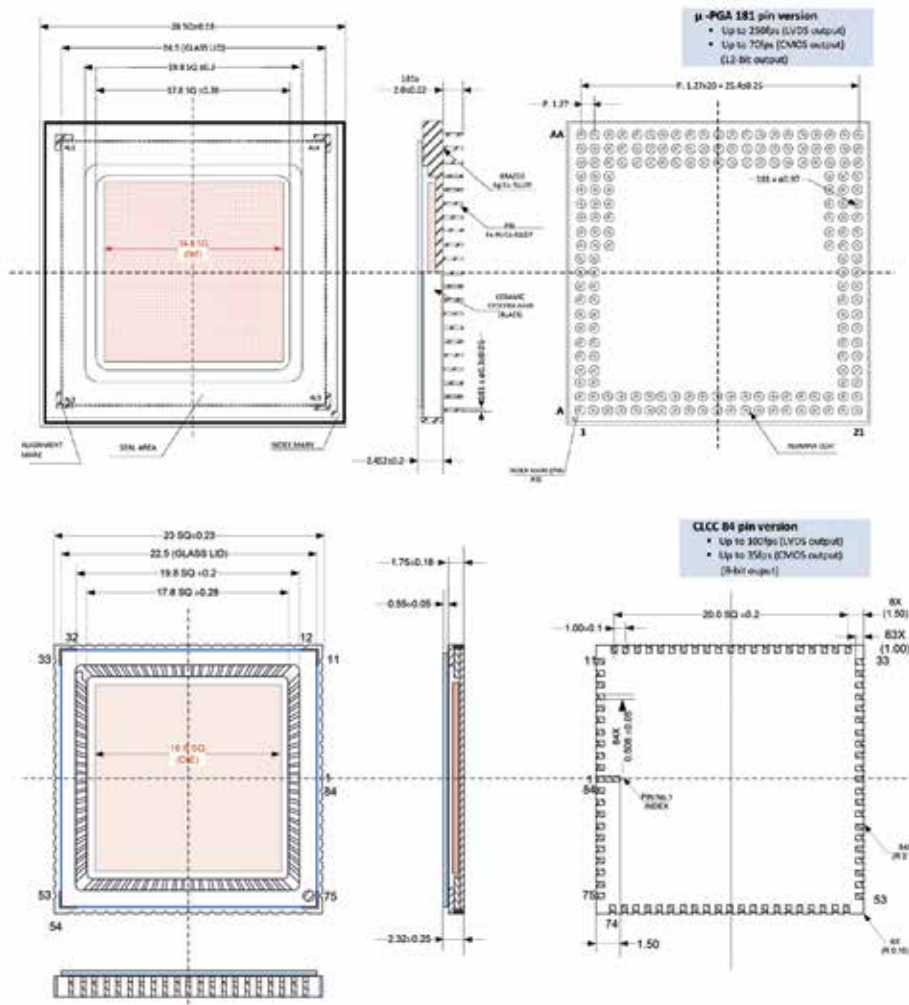
- 181-lead micro PGA ceramic package
- Low-cost 84 pin CLCC package
- Dual 3.3V/1.8V power-supply
- 2W maximum power consumption
- 9.6MHz external clock (XTAL) frequency
- Data output via 691Mbps LVDS ports (x24)
- 40°C to +125°C (junction)  
(Operating temperature)



# IMAGE SENSOR BLOCK DIAGRAM

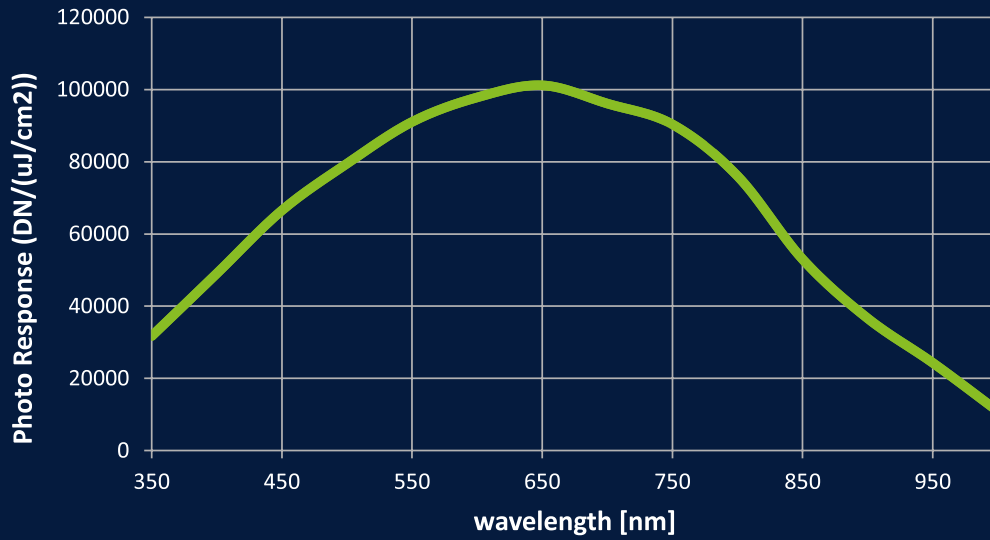


# PACKAGE DRAWINGS

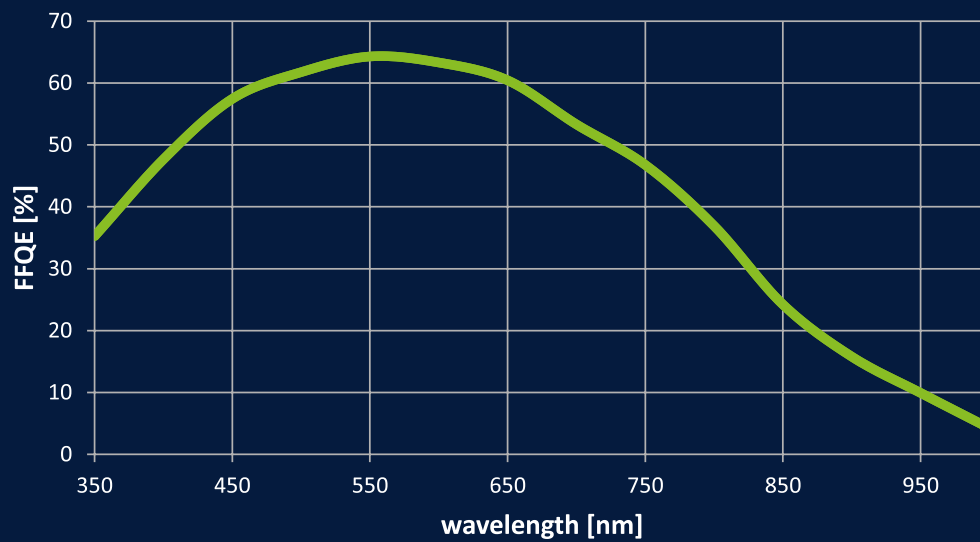


# PHOTO RESPONSE & FILL FACTOR x QUANTUM EFFICIENCY

## Photo Response (DN/( $\mu\text{J}/\text{cm}^2$ ))



## Fill Factor x Quantum Efficiency (%)



## ABOUT ANAFOCUS

ANAFOCUS, an e2v company, is a designer and supplier of standard off the shelf and fully customised high performance, high quality CMOS image sensors and vision sensors for the industrial, professional, scientific, medical and high end surveillance markets. ANAFOCUS works for top tier camera makers worldwide developing innovative image and vision sensor solutions for various application sectors.

ANAFOCUS started its operation in 2004. It is headquartered in the Scientific and Technological Park CARTUJA in Seville (Spain) which employs 80 engineers and technicians and occupies a total surface of 1,000m<sup>2</sup>, one fourth dedicated to technical installations including optical test labs, qualification labs, and clean room facilities for image sensor wafer sort and packaged sample test.

ANAFOCUS provides commercial and technical support by its own employees in Tokyo (Japan) since 2006. ANAFOCUS works for top tier camera makers worldwide developing innovative image and vision sensor solutions for various application sectors.

Carefully understanding customer needs and providing timely and fully satisfactory solutions is ANAFOCUS's top priority and a great success thus far; all customers for custom image sensor solutions in Japan and worldwide have repeated business on two or more occasions.

ANAFOCUS's key competence is the ability to develop on chip solutions combining:

- High sensitivity, low noise pixels based on pinned photodiode technology; global and rolling shutter with linear and HDR sensing
- Advanced analogue front end circuits for reading and digitising the pixels at high speed and with very low noise
- Area and power efficient digital processors performing optical corrections (FPN correction, shading correction, defective pixel correction, colour processing...) on the images, in real time, before being outputted through high speed LVDS ports or conventional CMOS ports
- Sophisticated control logic, such as on chip microcontrollers that simplify the communication with the sensor chip and provide great flexibility

Besides its CMOS image sensor design and production capabilities, ANAFOCUS employs an experienced engineering team with over 15 members expert in the development of camera complex hardware, FPGA firmware and software and real time image processing algorithms. This team, together with a dedicated project management and specialised product engineering team, closely works with the customers engineering team in the whole camera development cycle: from concept to commercialisation.



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