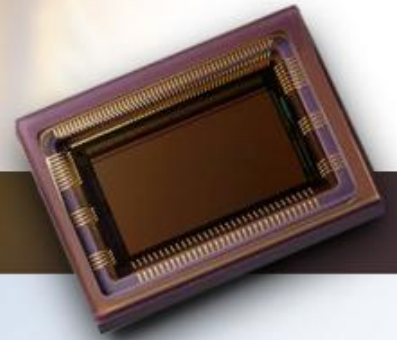


CMV2000 & CMV4000

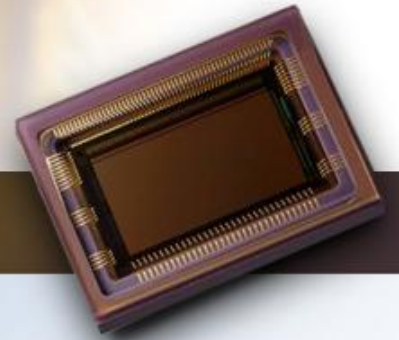
High speed machine vision image sensors

Contents

- Products definition
- Machine vision sensor demands
- Two resolutions for complete market coverage
- Sensor features
- Sensor architecture and package
- Electro-optical specifications
- Typical machine vision sensor applications
- The competition



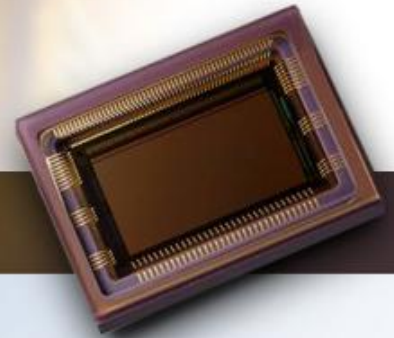
Definition of the product



- Talked to many potential customers
- Defined what was needed
- Proposed a specification list
- Feedback on product definition from beta customers
- Development of final product according to feedback

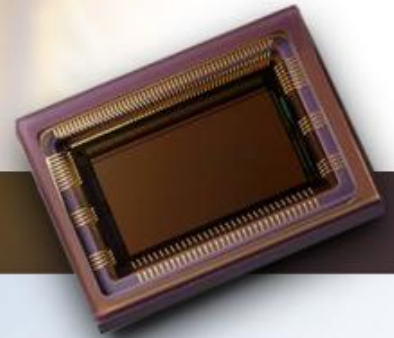
➔ Industry driven spec list!

Machine vision sensor demands



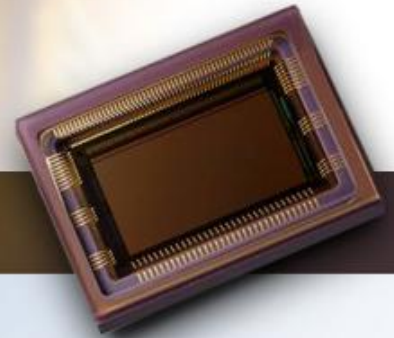
- Global shutter
 - Freeze fast moving object
 - No smear
- High sensitivity with low noise
 - Need enough image data with short exposure times
 - Low light sensitivity (apply gain if necessary)
 - Low parasitic light sensitivity
- Min 1.3Mpxl, preferably higher
 - High detail in large field of view
 - Use digital zoom

Machine vision sensor demands



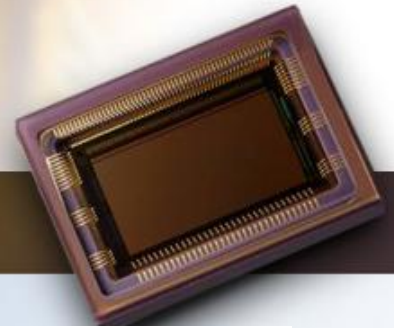
- High frame rate
 - Take a fast sequence of images to track movement
 - Exposure of an image while the previous is read out (pipelining)
- Ease of use
 - Implement on-board features
 - Programming of exposure and read-out modes using a SPI
- No image correction needed
 - No image post-processing needed
 - No dark frame subtraction (FPN correction)

2 resolutions



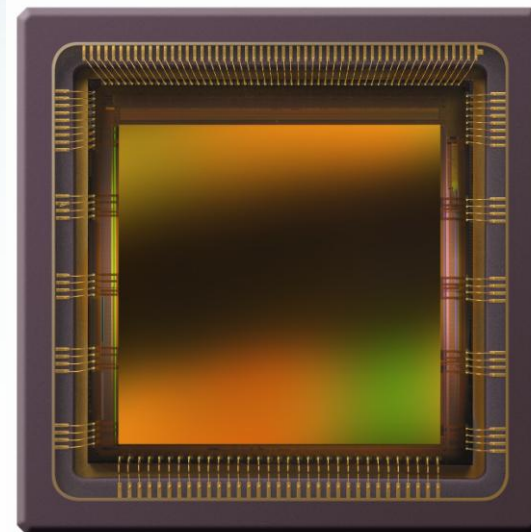
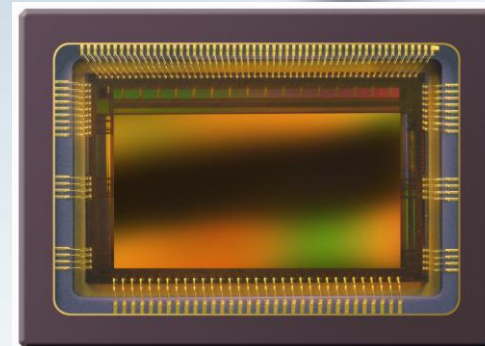
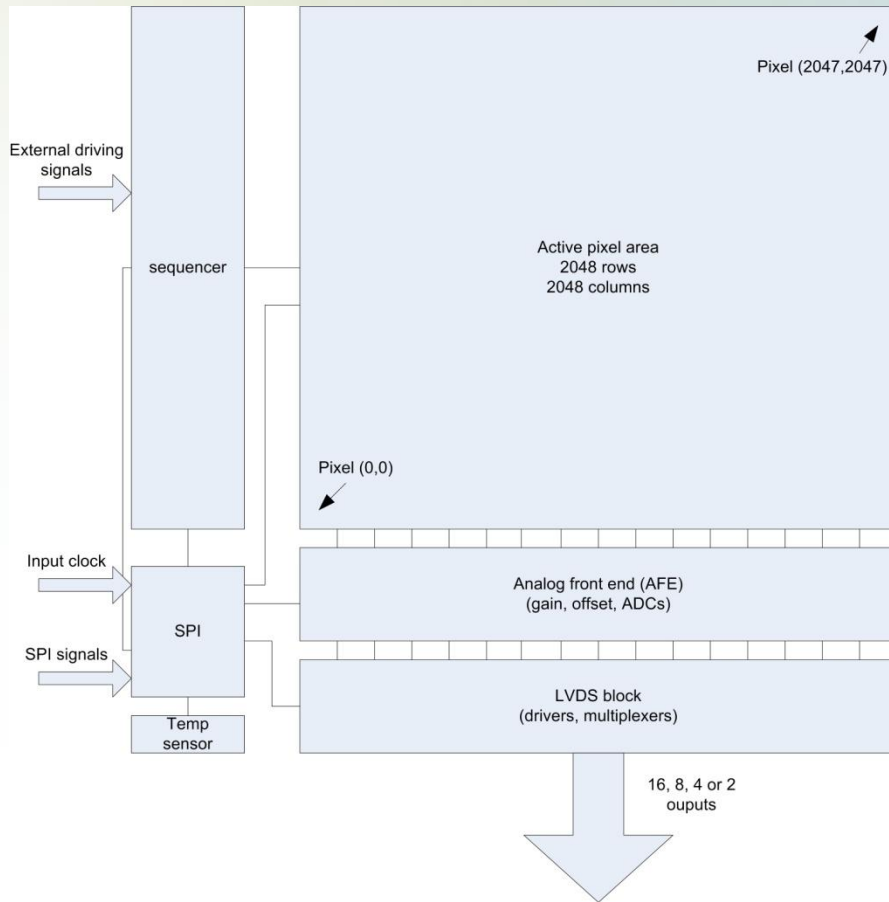
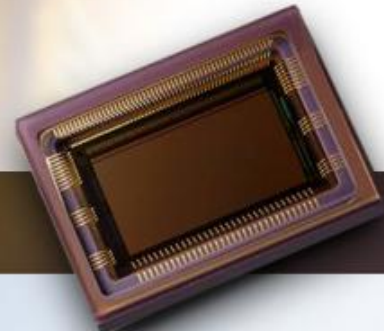
- CMV2000 – 2048 x 1088
 - Small form factor (2/3")
 - Competitive price
 - Support full HD
 - CMV4000 – 2048 x 2048
 - Square format for optimal lens area coverage
- ➔ Pin compatible with identical on-board features and electro-optical specifications

Sensor features

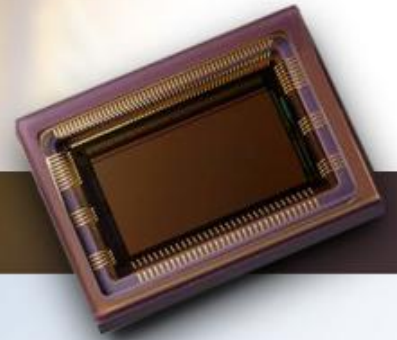


Feature	CMV2000	CMV4000
Resolution	2048 x 1088	2048 x 2048
Pixel size	5.5um x 5.5um	
Frame rate	340fps	180fps
Windowing	Row windowing (up to 8 separate ROIs)	
Image flipping	X and Y mirroring	
Output	16 LVDS outputs @ 480 MHz	
Multiplexing	To 8, 4 and 2 outputs	
ADC	10 bit, 12 bit at reduced frame rate	
High dynamic range	Multiple modes supported	
Programming	Over SPI interface	
Temperature control	On chip temperature sensor	
Sequencer	On chip timing generation	
Package	Ceramic μ PGA package (95 pins)	

Architecture

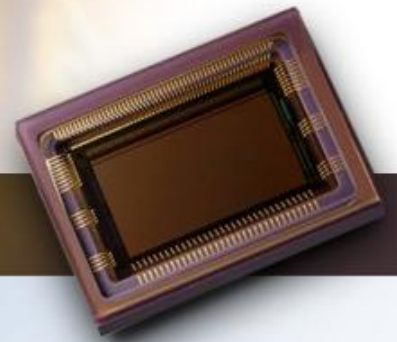


Architecture



- High speed
 - High speed column ADC's
 - Pipelined global shutter with CDS
 - 16 parallel high speed LVDS outputs (multiplexing possible)
- High sensitivity with low noise
 - Achieved by using a unique global shutter pixel with correlated double sampling (CDS)
 - High fillfactor for high sensitivity
- Ease of use:
 - LVDS outputs
 - On-board sequencer
- Small form factor
 - 95 pin package (18.6mm x 13.5mm or 18.6mm x 18.6mm)

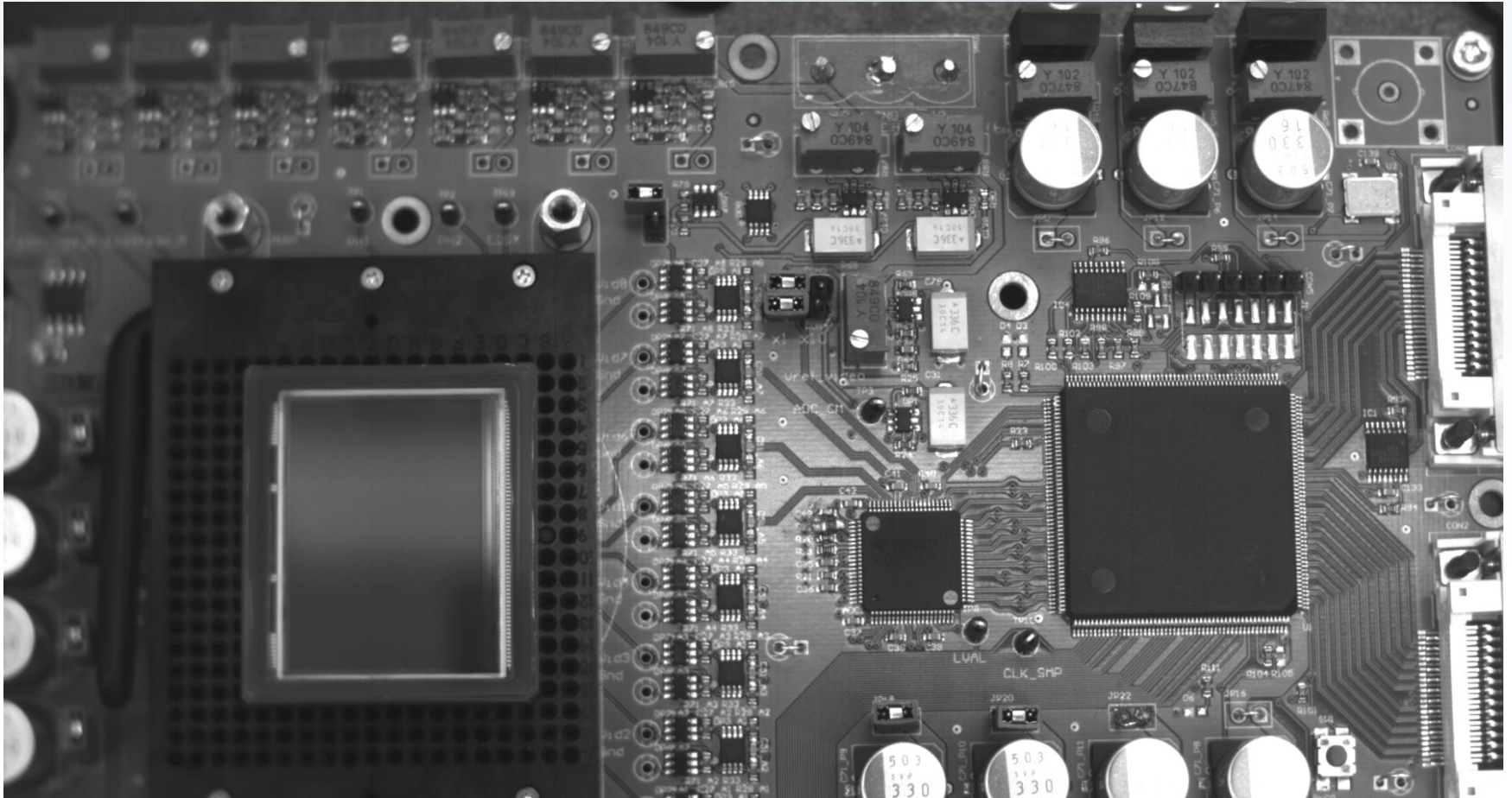
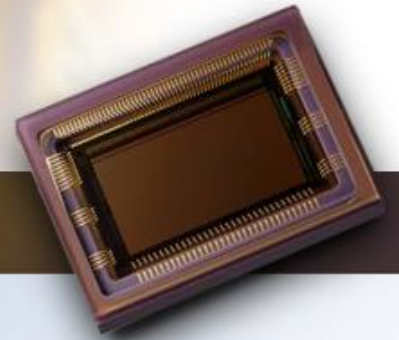
Sensor specifications



Specification	Value
Full Well charge	18Ke ⁻
Sensitivity	4.64 V/lux.s
Dark noise	16e ⁻
Conversion factor (10 bit mode)	0.070LSB/e ⁻
Dynamic range	60dB
Parasitic light sensitivity	1/ 50 000
Dark current (10 bit mode)	22 LSB/s (@ room temp)
Fixed pattern noise (10 bit mode)	<1 LSB
Power consumption	600mW

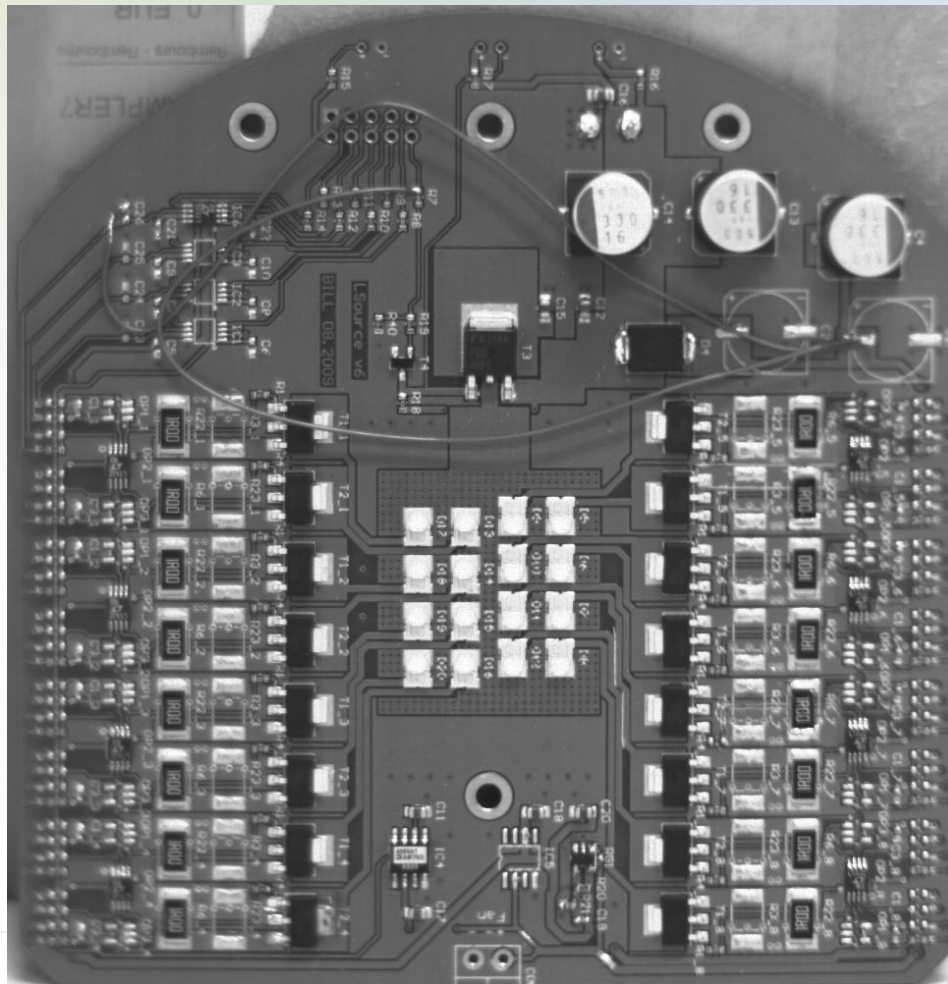
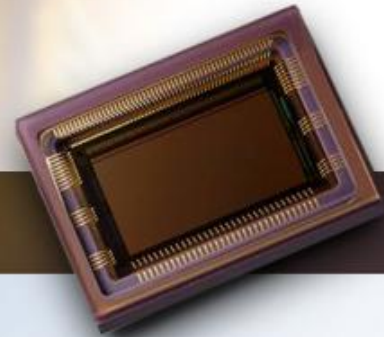
Example CMV2000

F/3, exposure 32ms, 300lux



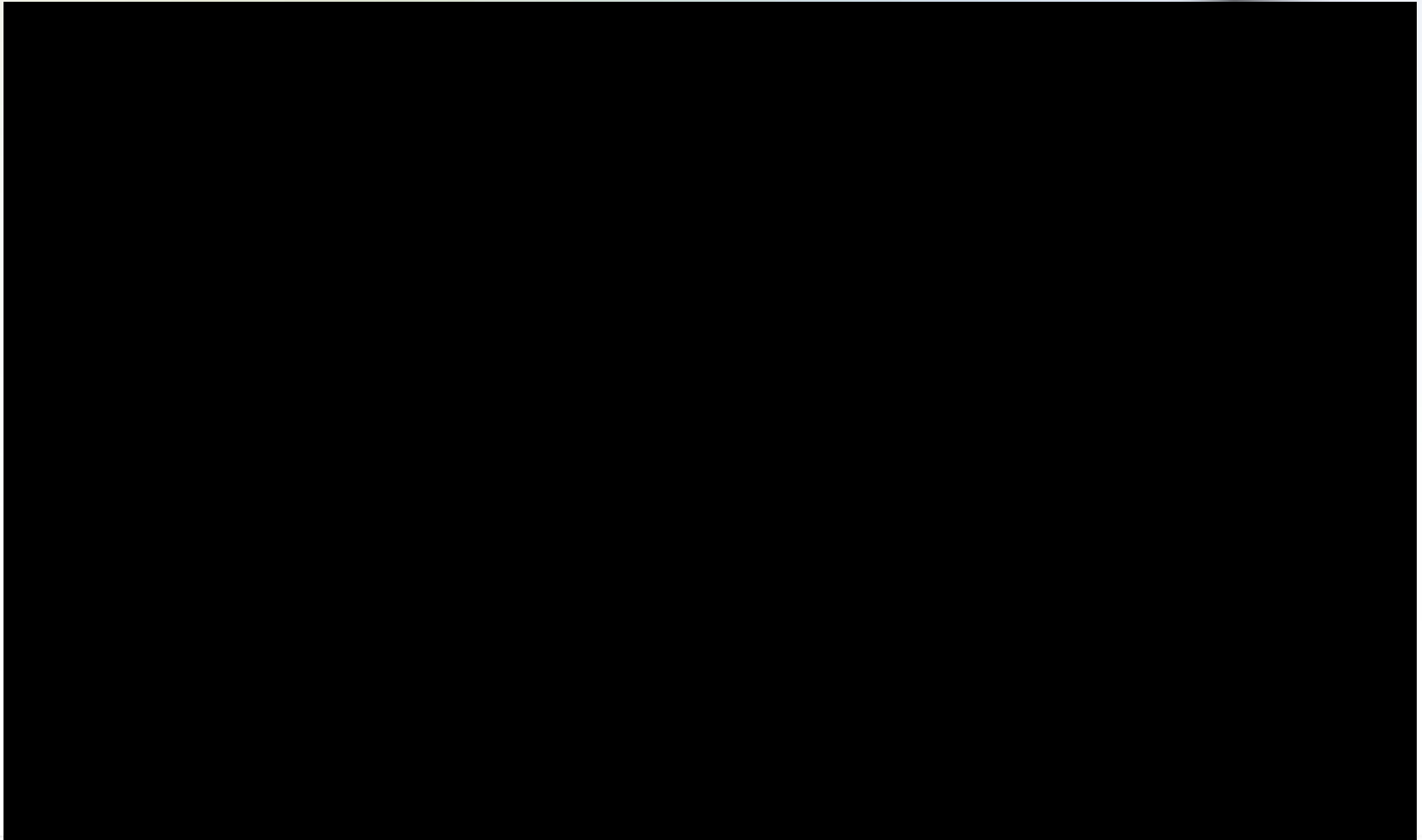
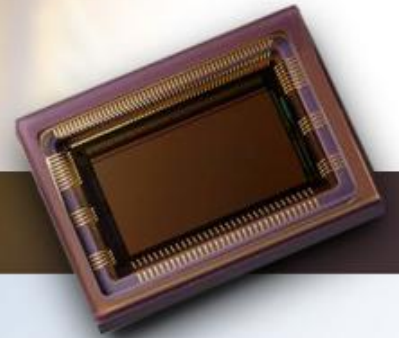
Example CMV4000

F/3, exposure 32ms, 300 lux



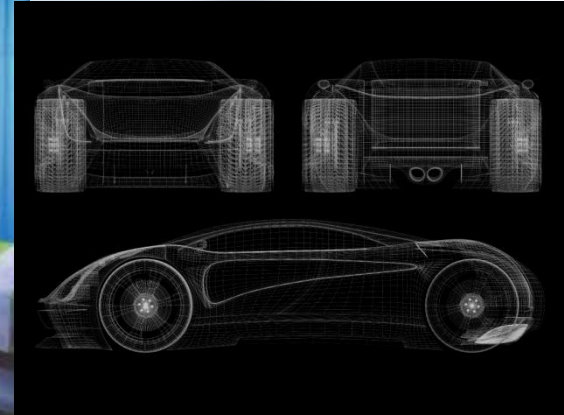
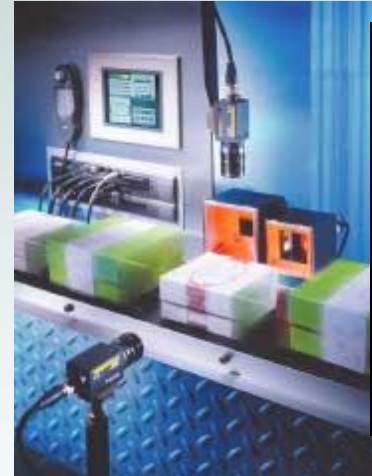
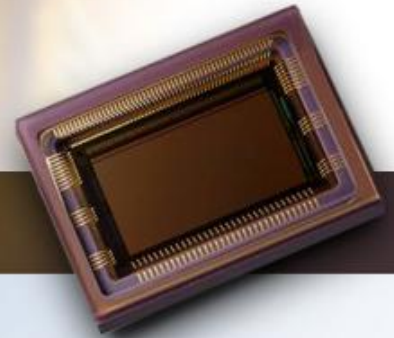
Movie example, CMV2000

Full resolution, 280 fps (340 fps max)

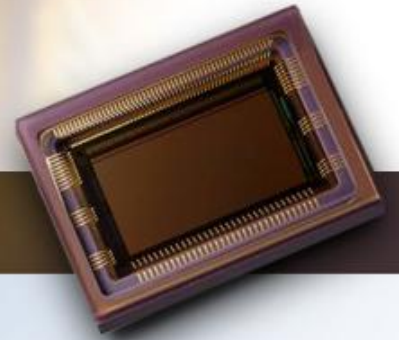


Typical Applications

- High speed machine vision
- Motion control
- Traffic monitoring
- High speed inspection
- Security
- HD camcorders
- Automotive
- Barcode reader



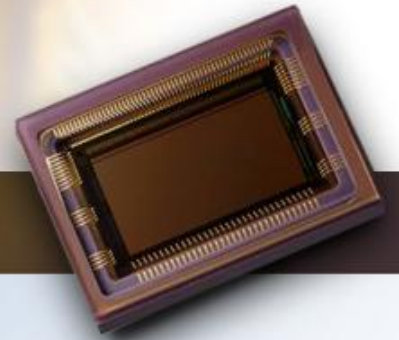
Applications



First prototype camera available: Gazelle camera from Point Grey
→ The CMV2000 and CMV4000 allow the new Gazelle series of Camera Link cameras to deliver an unsurpassed combination of size, speed, and price.



Summary



- Industry driven feature and specification list
- 2 pin compatible resolutions to cover every machine vision aspect
- High speed architecture with column ADC's and CDS using an 8T high sensitivity, low noise global shutter pixel.
- Easy programming using SPI and on-board sequencer
- High quality raw image
- High frame rate combined with excellent image quality.
- Wide range of applications

Further information

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- Sales support: info@cmosis.com
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