

# SiS1-p18



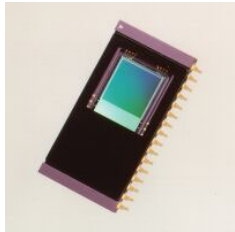
## HIGH RESOLUTION 1 MEGAPIXEL 15-BIT DYNAMIC SCIENTIFIC IMAGING SYSTEM



The Scientific System SiS1-p18 is a high resolution 1 megapixel camera system with 2 megapixel interlaced image resolution and 15-bit dynamic designed for all kinds of industrial and scientific applications. The square 2/3" frame transfer CCD image sensor Philips FT18 with 7.68mm x 7.68mm active image area and square pixel of 7.5 $\mu$ m x 7.5 $\mu$ m size fits optimally for quantitative intensity measurements with high intensity and spatial resolution due to the 100% fill factor, high full well capacity and low dark current especially for photometric studies in biological, physical and technical fields. The flexible timing modes of the camera incorporate the framing mode for very fast kinetic studies.

Features	
<b>Highest Sensitivity</b> ▶	Low readout noise SNR of 4e <sup>-</sup> rms with a special "correlated double sampling" signal processing technique and a pixel size of 7.5 $\mu$ m x 7.5 $\mu$ m.
<b>14-bit Digitalization</b> ▶	Intensity resolution of 16,384 grayscales, 64 times better than 8-bit systems, important for photometric measurements and structures with low contrast. Averaging of statistical noise with image accumulation offers 15-bit dynamic. 18-bit digitalization with 16-bit data transfer for 19-bit dynamic is optional.
<b>Low Dark Current</b> ▶	The special internal chip structure of the CCD image sensor reduce the dark current down to 85e <sup>-</sup> /pixel/s @ 15°C for $\mu$ -Lux imaging with long time integration.
<b>Photometric Linearity</b> ▶	Proportionality of measured counts to incoming light intensity better than 0.4%, optimizable to linearities < 0.1% with correction tables.
<b>High Resolution</b> ▶	1 megapixel frame transfer CCD image sensor Philips FT18 with 7.68mm x 7.68mm image area and square pixel with a size of 7.5 $\mu$ m x 7.5 $\mu$ m. 2 megapixel interlaced.
<b>External Timing</b> ▶	Asynchronous electronic integration time control by external gate input. Integration times from 10ms up to > 100s, optionally expandable.
<b>Super Pixel Binning</b> ▶	Selectable binning of charges of adjacent pixels onto the CCD Chip with single readout increases linearly the signal to noise ratio by reduced spatial resolution.
<b>Anti-Blooming Function</b> ▶	Blooming from one overexposed pixel to adjacent pixels will be avoided by an efficiency of an overexposure factor of >200 relative to the full well capacity.
<b>High Full Well Capacity</b> ▶	Photon statistics S/N= $\sqrt{S}$ determines the signal to noise ratio SNR up from average intensities. High dynamic demands high electron capacity.
<b>100% Fill Factor</b> ▶	High precision measurements require full sensitivity of the whole image area, because otherwise small image structures result in moiré-effects.
<b>WinSIS-Software</b> ▶	WinSIS6 for WinXP/2000/NT/9x controls all camera functions and integration timing. The concept of intuitive easy-to-use operation for all imaging and processing functions with integrated job creation and macro definition offers a fast realization of complex applications without long training periods. SDK for personal programming.

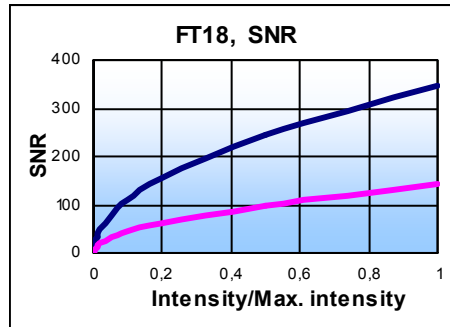
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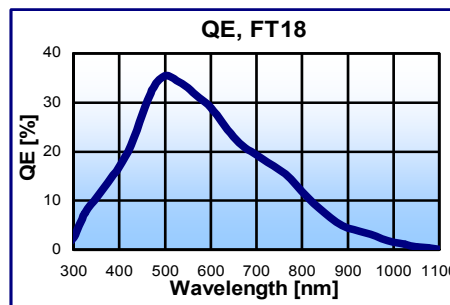
CCD Image Sensor  
Philips FT18

## Specifications

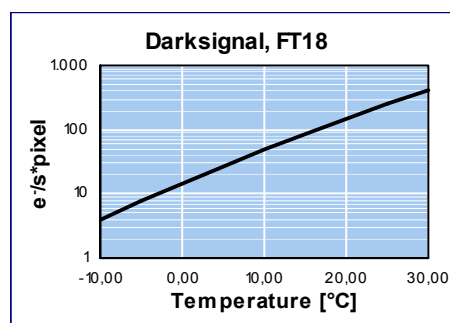
CCD Image Sensor	Philips FT18
Sensor Type	Frame Transfer
Sensor Format	1 : 1
Image Size	7.68mm x 7.68mm, 10.9mm diagonal
Pixel Size	7.5µm x 7.5µm
Pixel Count	1024 (H) x 1024 (V) 1024 (H) x 2048 (V), interlaced
Electron Capacity	120,000e <sup>-</sup>
Readout Noise, rms	4e <sup>-</sup>
Dynamic	30,000 : 1
Dark Current @ 15°C	40e <sup>-</sup> / Pixel / s
Quantum Efficiency	> 30%
Anti-Blooming	> 200 x e <sup>-</sup> capacity
Binning	horizontal, vertical
Digitalization	14-bit, 16,384 : 1 16(18)-bit, 65,536 : 1
Readout Frequency	6 MHz; 3 MHz (14-bit) 1 MHz (16/(18)-bit)
Integration Time	10ms to >100s
Frame Rates	5.4 Hz; 2.7 Hz; 0.9 Hz
Optical Mount	c-mount and special
Mech. Dim. ( BxHxL )	100x80x165mm
Weight	800g
Operational Temperature	0 ... +40°C



At high light intensities the Signal to Noise Ratio SNR is mainly determined by the full well capacity (FT18: 120,000e<sup>-</sup>) of the CCD image sensor. The chart shows the graph of an interline transfer sensor (purple, FW: 18,000e<sup>-</sup>) for comparison.



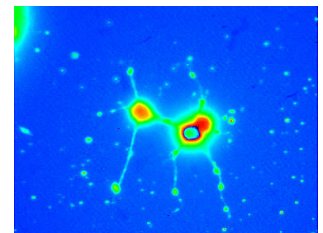
The quantum efficiency QE is defined as the percentage of the incoming photons, which generate an electronic charge.



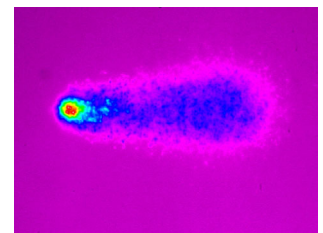
The temperature depending dark current of a CCD image sensor results from the thermal generation of electrons. The increase of the temperature of 6°C to 9°C doubles the dark current.

## Applications

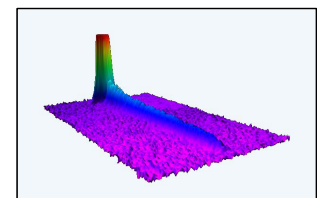
- ▶ LowLightLevel Imaging
- ▶ Fluorescence
- ▶ Luminescence
- ▶ Chemiluminescence
- ▶ Comet Assay
- ▶ FISH
- ▶ Spectroscopy
- ▶ Electrophoresis
- ▶ Gel-applications
- ▶ Astronomy
- ▶ Combustion processes
- ▶ Quality control
- ▶ Process control
- ▶ BEC



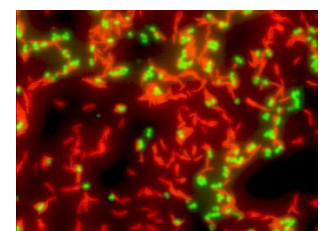
FURA, calciumfluorescence  
of a cancer cell



DAPI, Comet Assay



Absorption,  
atom laser beam



FISH Megaapex

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