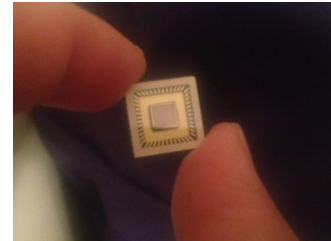


## Product overview

The Anitoa ULS24 is an ultra-low-light CMOS image sensor. Its low cost, small form factor and high level of integration make it optimally suited for use in a portable device in medical, scientific and industrial applications. An example of such application is a field portable nucleic-acid-test (NAT) system that performs molecular sensing based on fluorescence or chemiluminescence signaling principles.



ULS24 is built on 0.18um CMOS process at a world-leader specialty semiconductor foundry.

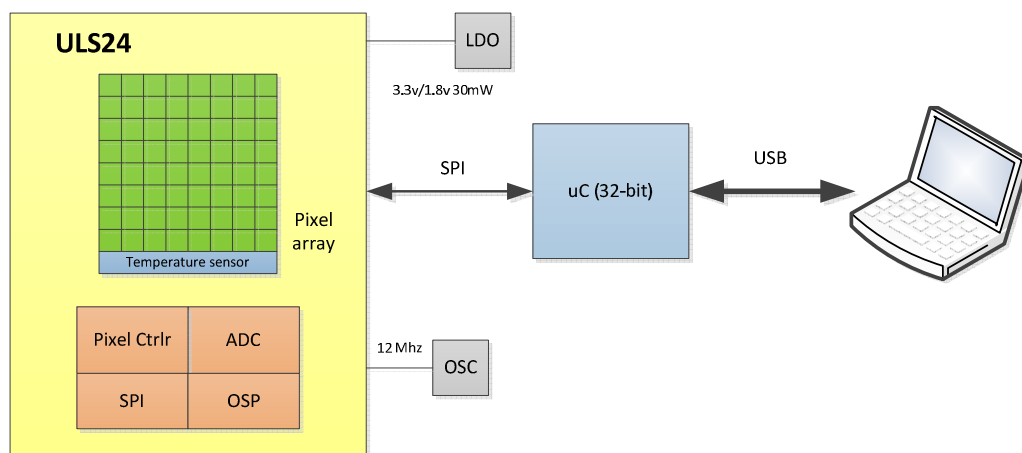


Figure 1 ULS24 Chip Application Block Diagram

## Features

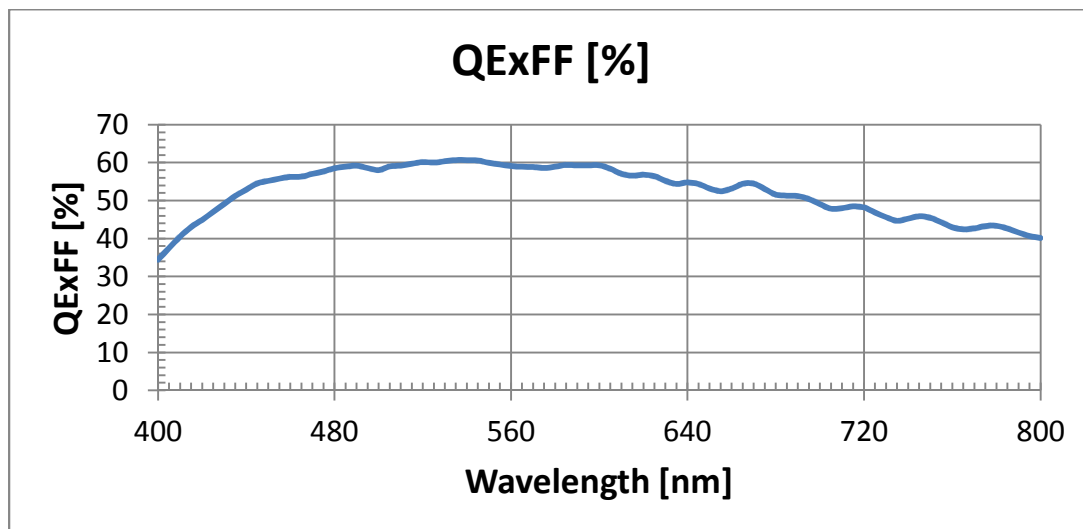
- Ultra low-light sensitivity. Detection threshold  $\sim 3.0 \times 10^{-6}$  lux
- Low dark current, high SnR (>13dB at detection threshold).
- 12-bit ADC
- Wide dynamic range (> 85dB).
- Digital interface through Serial Peripheral Interface (SPI).
- Built-in junction temperature sensor.
- 3.3V and 1.8V power supply, 30mW max power.
- Operating temperature range  $-15\text{ }^{\circ}\text{C} - 85\text{ }^{\circ}\text{C}^1$ .

<sup>1</sup> The image sensor can meet noise spec at junction temperature up to 45 °C

## Key parameters

Imager size	4.9mm x 4.8mm; Sensing area: 3.6mm x 3.6mm
Active pixels	24x24
Pixel size	150um x 150um (4 can be combined into a 300um x 300um "big pixel")
Integration time	100us - 100 seconds, software controlled
ADC resolution	12-bit
Signal Interface	Serial Peripheral Interface (SPI), 4 wires
Responsivity	135V/lux-sec @550nm in high-gain mode 540V/lux-sec @550nm in high-gain 4-bin mode 4200V/lux-sec with 2850k light in high-gain 4-bin mode
Detection threshold (550nm)	$\sim 3.0 \times 10^{-6}$ lux or $\sim 4.4 \times 10^{-7}$ uW/cm <sup>2</sup>
Dynamic range	>85dB
SnR	13dB minimum at detection threshold
Supply	3.3V (analog); 1.8V (digital)
Power consumption	< 30mW
Operating temperature	-15 – 85 °C (up to 45 °C to meet optical performance spec).
Temperature sensor spec	$\pm 0.3$ °C accuracy. -15 to 85 °C range. Need calibration.
Packaging	48-pin CLCC

Quantum efficiency (QE) x Fill factor (FF) vs. Wavelength:



### ULS 24 Solution Kit

The ULS24 Solution Kit is available as an “out of box” solution to allow users to conveniently evaluate ULS24. The ULS 24 Solution Kit includes the ULS 24 Sensor IC, an interface board, and software. This solution kit can readily interface with a PC via USB.

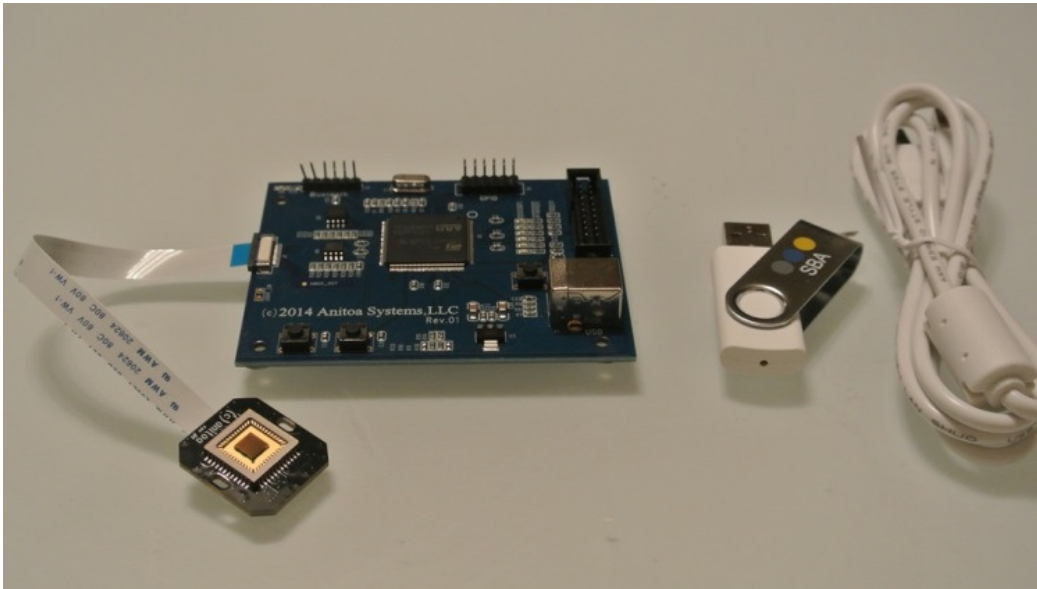


Figure 2 ULS24 Solution Kit

## Applications

### Biomedical and life science

Molecular sensing/imaging based fluorescence and chemiluminescence signaling principles.

- DNA and RNA quantification, fluorescent-based
- Miniaturized qPCR system or digital qPCR
- Fluorescence or chemiluminescence-based Immunoassay/ELISA
- DNA or Protein microarray
- Pyro-sequencing
- Capillary electrophoresis
- Cell sorting/Flow cytometry/Imaging flow cytometry
- Fluorescence Images Guided Surgery (FIGS)

### Industrial

- Compact portable spectrometer
- Material analysis instrument for oil and gas exploration
- Hazard and thread detection instruments

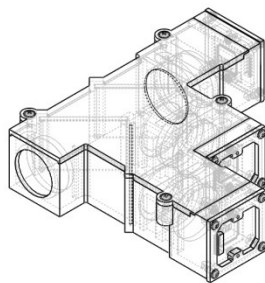


Figure 3. Compact multi-wavelengths fluorescent imager based on ULS24

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