

## Key Features

Supports Hamamatsu CCD series S703x

Dynamic range of up to 16 bit

Line-binning and 2D readout modes supported

Easy to integrate and use

Compatible to tec5 Operating Electronics

## Advantages for Applications

The series S703x of Hamamatsu back thinned/ back illuminated CCD arrays combines a high sensitivity over the whole spectral range from deep UV to NIR with the high dynamic range of a classical photo-diode detector array. In addition these arrays are available with up to 1044 pixel. This makes it a superior device for all types of UV-VIS-NIR spectroscopy especially for low light level detection like fluorescence or diffuse reflection measurements. Due to the capability to detect even smallest amounts of light it allows short exposure times. Therefore, it is a perfect tool for high speed process control.

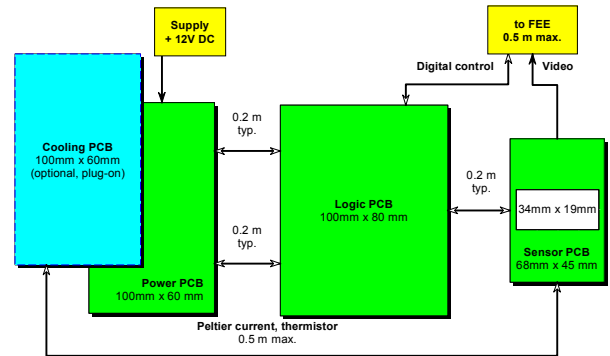
The preamplifier electronics provides an easy integration in the existing family of detector array Operating Electronics. This gives the user the benefit to extend the own product line by a CCD based device.

## Working Principle

The preamplifier electronics interfaces directly the CCD chip. It provides all required digital signals for managing the readout process of the array. In addition it generates all necessary supply voltages from a 12V DC input.

An optional temperature control board is available for cooled CCD types.

The preamplifier electronics connects to a special Operating Electronics (Front End Electronics and Interface Electronics), where further data processing like AD conversion, buffering and data transfer to the computer is performed.



Configuration of the DZA-S7030-4 system

## Operation Modes

The preamplifier electronics supports both the so-called line-binning mode as well as the 2 dimensional readout mode.

### Mode 'Line-binning'

In this operating mode, the information of all pixels of a column is combined. It imitates a classical 1D array for spectroscopy with a large pixel height, providing all the advantages of a large pixel area. The array data is compressed to a one dimensional format so that there is no disadvantage of long readout times due to high number of pixels.

### Mode 'Imaging'

The imaging mode allows to access the information from each individual pixel. Various "submodes" are possible.

Currently, the imaging mode is not supported by the subsequent Operating Electronics. Suitable electronics are in preparation.



## Supported Sensors / Detector Arrays

Supported CCDs: Hamamatsu back thinned / back illuminated CCDs series S7030, S7031, S7033, S7034, 7170 and 7171 (see table below)

| Type       | Cooling             | Pixel count |
|------------|---------------------|-------------|
| S7030-0906 | Non-cooled          | 532 x 64    |
| S7031-0906 | One-stage TE-cooled | 532 x 64    |
| S7030-0907 | Non-cooled          | 532 x 128   |
| S7031-0907 | One-stage TE-cooled | 532 x 128   |
| S7033-0907 | Non-cooled          | 532 x 128   |
| S7034-0907 | One-stage TE-cooled | 532 x 128   |
| S7030-0908 | Non-cooled          | 532 x 256   |
| S7031-0908 | One-stage TE-cooled | 532 x 256   |
| S7170-0909 | Non-cooled          | 532 x 520   |
| S7171-0909 | One-stage TE-cooled | 532 x 520   |
| S7030-1006 | Non-cooled          | 1044 x 64   |
| S7031-1006 | One-stage TE-cooled | 1044 x 64   |
| S7030-1007 | Non-cooled          | 1044 x 128  |
| S7031-1007 | One-stage TE-cooled | 1044 x 128  |
| S7033-1007 | Non-cooled          | 1044 x 128  |
| S7034-1007 | One-stage TE-cooled | 1044 x 128  |
| S7030-1008 | Non-cooled          | 1044 x 256  |
| S7031-1008 | One-stage TE-cooled | 1044 x 256  |

Table 1: List of supported CCD's

## Board Arrangement

The preamplifier electronics is of modular design and, therefore, consists of several boards or functional units, respectively.

Sensor board: small board for carrying the sensor chip. It has a big opening for access to the chip backplane. This allows to attach heat conducting devices for proper temperature control. The compact size allows easy integration in all optical setups, e.g. the distance of the chip to a spectrometer input can be very short, which ends up in a small split-off angle between optical input and output of the imaging spectrometer device.

Logic board: provides digital management of the sensor array (clocking and control / status functions)

Power supply board: generates all necessary supply voltages for the unit out of +12 VDC.

Cooling controller board: contains the temperature controller chip to stabilize a set temperature of the sensor chip. The optional board (not all supported CCDs contain / require cooling) can be slipped on to the power supply board.

All boards are interconnected by flat-ribbon cables.

For operation, a tec5 Operating Electronics with a Front End Electronics of type FEE-CCD is required.

## Technical Data / Performance

Configuration: line-binning mode

- readout time of a detector array with 1044 lines less than 10 ms
- minimum integration time equivalent to readout time
- intensity resolution: 16 Bit
- operating mode selection by software and or solder gaps
- modular board configuration
- required power: + 12 VDC, 3A (with temperature controller)
- dimensions:
  - sensor PCB: 68 mm x 45 mm
  - logic PCB: 100 mm x 75 mm
  - power supply PCB: 100 mm x 60 mm
  - cooling controller PCB: 100 mm x 60mm



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