

## High-Sensitivity & High-Resolution, TE-Cooled Back-Thinned Spectrometer

# ATP5200

### Feature:

- Detector: Back-thinned illuminated CCD (cooled to - 10°C)
- Pixels: 2048 pixels
- UV or NIR response enhanced optimization: UV response enhanced: ATP5200P, NIR response enhanced: ATP5200R
- Low noise CCD signal processing circuit
- Max. Wavelength Range: 180-1180nm(depends on specific requirements)
- Optical Sensitivity: 0.01-3nm (Depends on range and slit).
- Optical Path: Crossed C-T
- Integration Time : 2ms-130s
- Power Supply : DC 5V± 10% @ <2.3A
- 18 bit, 570KHZ ADC (workable output 16bit)
- Interface : SMA905 or free space
- Trigger: USB2.0 (High speed) or UART
- 20 pins dual-row programmable external expansion interface

### Applications:

- Raman spectrometer, online Raman analysis
- Micro volume spectrophotometer
- Weak fluorescent light detection
- Reflectance, Transmittance, Absorbance detection
- Fruit Sorting.

### Description:

ATP5200 is the fifth generation of TE-cooled high performance spectrometer, which is self-developed by Optosky, It uses a back-thinned TE-cooled linear CCD with a semi-conductor cooling technology. The CCD can set in constant temperature environment (up to - 10 degree), which greatly reduces sensor noise at an excellent signal-to-noise ratio (about 2 times higher than competitors level), and it improves the reliability, so the measurements results can not change with the ambient temperature.

Meanwhile, it uses lowest noise CCD signal processing pcb to reach a noise less than 3 counts, which still the best low noise level.

The ATP5200 can receive SMA905 fiber optic input or free-space light to output spectral data via USB2.0 or UART port. It connects to 5V DC power supply, easy-to-integrate to wide industrial spectroscopy application.

| Model     | Features                                 |
|-----------|--|
| ATP5200   | 2048 pixels, cooled - 5°C                |
| ATP5200P  | 2048 pixels, cooled - 10°C               |
| ATP5200R  | NIR enhanced, 2048 pixels, cooled - 10°C |
| ATP5200-4 | 4096 pixels, cooled - 5°C                |



## 1. Parameters

|                       | ATP5200                                       | ATP5200-4        | ATP5200P                    | ATP5200R                    |
|-----------------------|---|------------------|-----------------------------|-----------------------------|
| Detector              |   |                  |                             |                             |
| Model                 | Linear array CCD                              | Linear array CCD | Area array back-thinned CCD | Area array back-thinned CCD |
| Cooling Temperature   | -5°C  | -5°C             | -10°C                       | -10°C                       |
| Spectrum Range        | 180-1100nm                                    | 180-1100nm       | 180-1100nm                  | 180-1180nm                  |
| Effective Pixels      | 2048  | 4096             | 2048×64                     | 2048×64                     |
| Pixel size            | 200×14  | 200×7            | 14×14                       | 14×14                       |
| SNR                   | 450:1   | 450:1            | 850:1                       | 850:1                       |
| Dynamic Range         | 10000; 1                                      | 10000; 1         | 15000; 1                    | 15000; 1                    |
| OPTICAL PARAMETER     |   |                  |                             |                             |
| Wavelength Range      | 180-1180nm ( Depends on specific application) |                  |                             |                             |
| Optical Resolution    | 0.01-3nm (Depend on range & slit)             |                  |                             |                             |
| Optical Design        | f/4 crossed, asymmetrical C-T                 |                  |                             |                             |
| Focus                 | 98 mm for incidence / 107 mm for output       |                  |                             |                             |
| Silt size             | 5, 10, 25, 50, 100, 150, 200µm (optional)     |                  |                             |                             |
| Optical Interface     | Fiber optic interface SMA905, free space      |                  |                             |                             |
| ELECTRICAL PARAMETERS |   |                  |                             |                             |
| Integration Time      | 400µs~10s                                     | 400µs~10s        | 5 ms - 30 min               | 5 ms - 30 min               |
| Data output interface | USB 2.0                                       |                  |                             |                             |
| ADC                   | 16bit   | 16bit            | 18 bit (Output 16bit)       | 18 bit (Output 16bit)       |
| Supply Voltage        | DC 5V±10%                                     |                  |                             |                             |
| Working current       | <2.3A   |                  |                             |                             |
| Storing Temp          | -20°C to +70°C                                |                  |                             |                             |
| Working Temp          | -10°C to +50°C                                |                  |                             |                             |
| PHYSICAL              |   |                  |                             |                             |
| Size                  | 208×120×47 mm                                 |                  |                             |                             |
| Wight                 | 1.5-1.7 kg                                    |                  |                             |                             |

## 2. ATP5200P vs ATP5200R

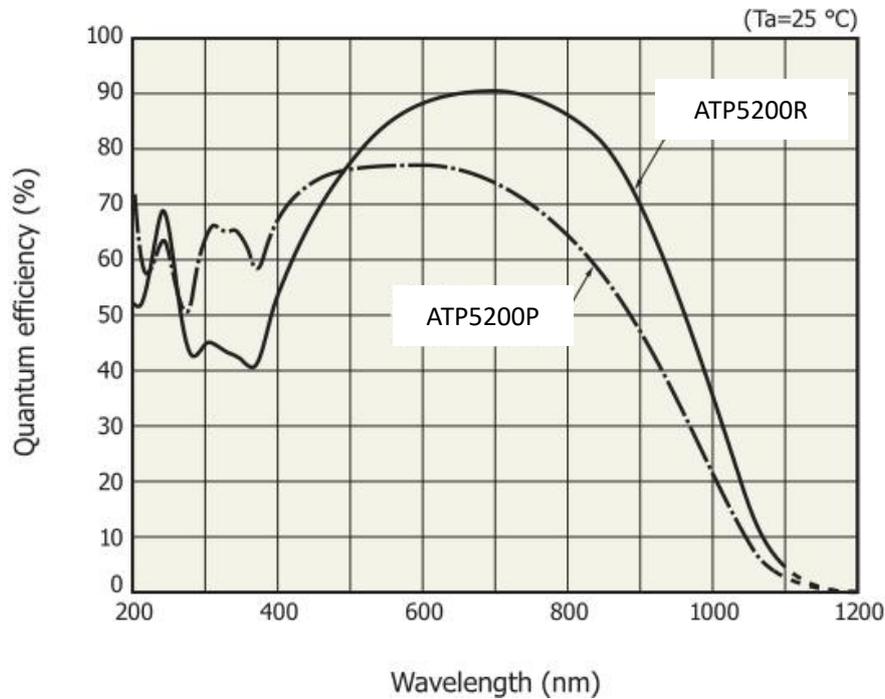


Fig 1 ATP5200R is designed to enhance NIR response, the higher NIR response in the rear range >500nm, ATP5200P is designed to enhance UV response, the higher UV response in the front range <500nm.

## 3. ATP5200P vs ATP5020P

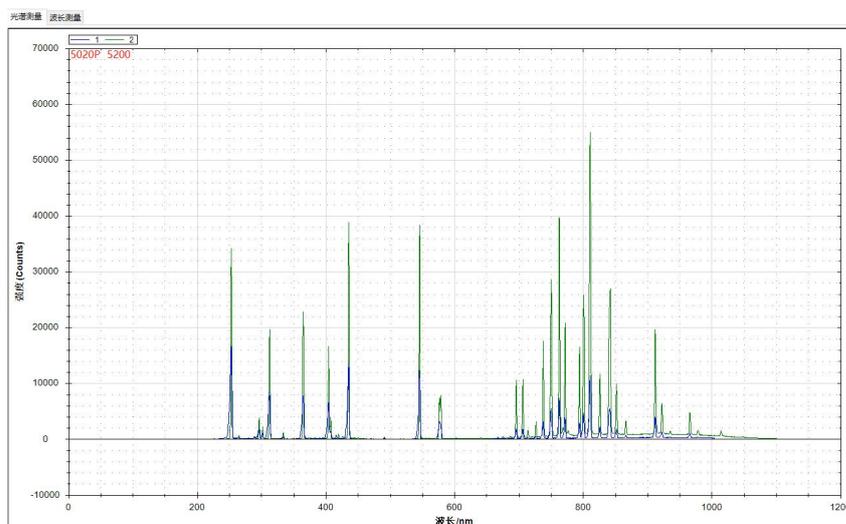


Fig 2 ATP5200P and ATP5020P measured the data of mercury-argon lamp respectively (same measurement conditions).

The green line is the measured spectrum of ATP5200P, and the blue line is the measured spectrum of ATP5020P. It can be seen from the figure that the sensitivity of ATP5200P is more than one times higher than that of ATP5020P.

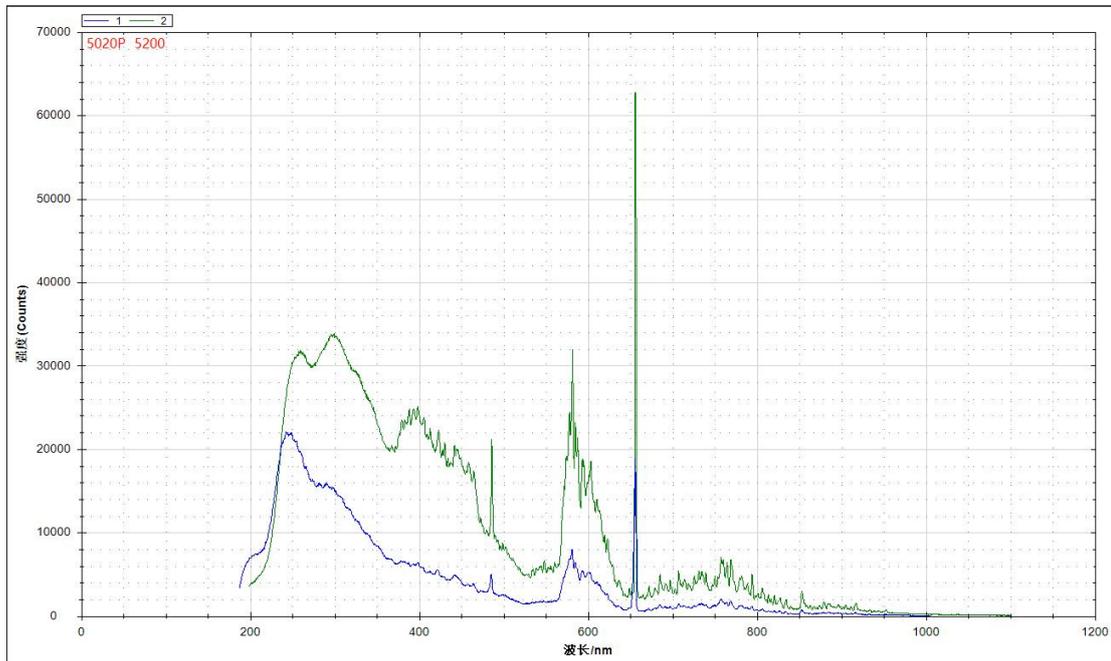


Fig 3 ATP5200P and ATP5020P measured the data of deuterium halide lamps respectively (under the same measurement conditions). The green line is the measured spectrum of ATP5200P, and the blue line is the measured spectrum of ATP5020P. It can be seen from the figure that the sensitivity of ATP5200P is one times higher than that of ATP5020P.

## 4. ATP5200





## 5. Mechanical Diagrams

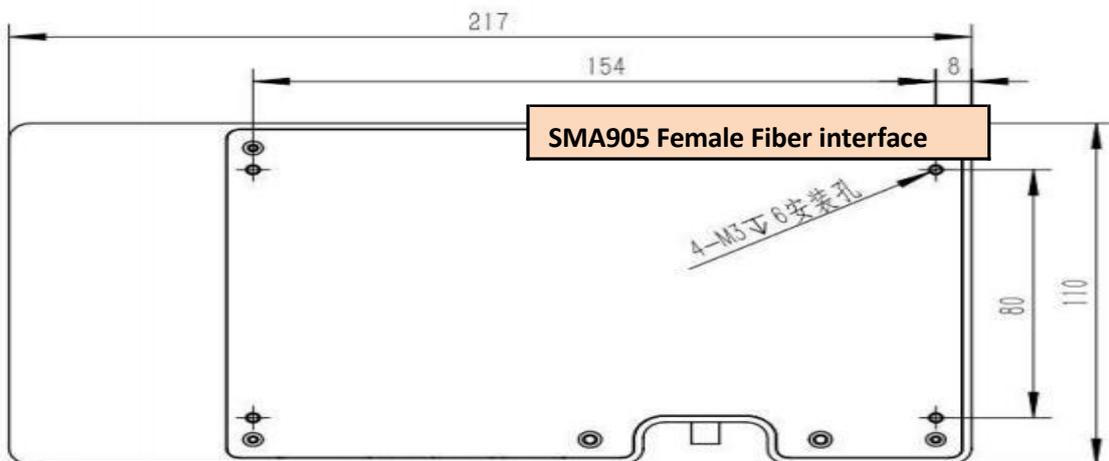
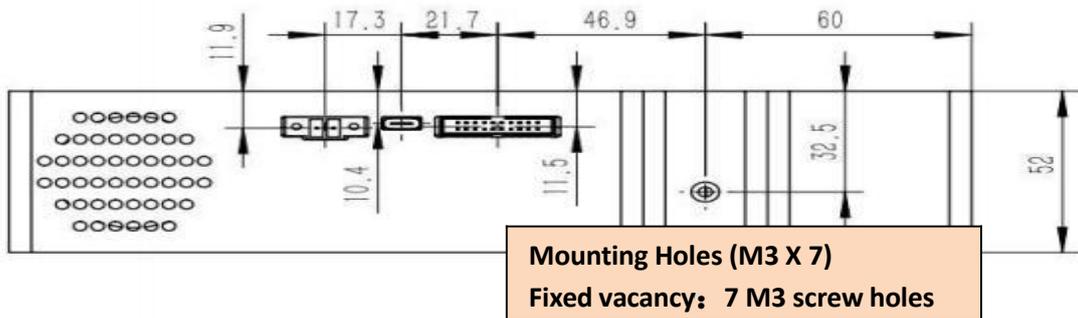


Fig 4 Dimension

## 6. Electrical Pin-out

| Parameter                 | Min  | Typ | Max  | Unit |
|---------------------------|------|-----|------|------|
| Operating voltage range   | 4.5  | 5   | 5.5  | V    |
| Operating current         | 170  | 500 | 2000 | mA   |
| High level input voltage  | 1.7  |     | 3.6  | V    |
| Low level input voltage   | -0.3 |     | 1    | V    |
| High level output voltage | 2.4  |     |      | V    |
| Low level output voltage  |      |     | 0.4  | V    |

Table 1 Electrical Characteristics

The module is equipped with a 20-pin male angled box header(2x10, 200 mm pitch) and USB2.0 B type interface.

The 20-pin connector is a Samtec part # STMM- 110-02-L-D-RA connector. The mate to this is a Samtec part #

TCSD- 10-D-XX.XX-01-N.

Table 2 Electrical Pin-Out

| Pin# | Description       | I/O              | Function Description  |
|------|-------------------|------------------|---|
| 1    | VCC               | /                | Power Supply, 5V±0.5,   |
| 2    | GND               | /                | Ground  |
| 3    | UART_TX           | Output           | UART Transmit signal  |
| 4    | UART_RX           | Input            | UART Receive signal   |
| 5    | Lamp_En           | Output           | LVTTL output the lamp enable signal.  |
| 6    | Continuous_strobe | Output           | LVTTL output the continues strobe signal.   |
| 7    | Ext_trigger_in    | Input            | LVTTL input the trigger signal.   |
| 8    | Single_strobe     | Output           | LVTTL output the single strobe signal.  |
| 9    | SPI_SCK           | Output           | The SPI Clock signal for communications to other SPI peripherals                      |
| 10   | SPI_MOSI          | Output           | The SPI Master Out Slave In (MOSI) signal for communications to other SPI peripherals |
| 11   | SPI_MISO          | Input            | The SPI Master In Slave Out (MISO) signal for communications to other SPI peripherals |
| 12   | SPI_CS            | Output           | The SPI Chip/Device Select signal for communications to other SPI peripherals         |
| 13   | GPIO0             | Input<br>/Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.            |
| 14   | GPIO1             | Input<br>/Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.            |
| 15   | GPIO2             | Input<br>/Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.            |
| 16   | GPIO3             | Input<br>/Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.            |
| 17   | GPIO4             | Input<br>/Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.            |
| 18   | GPIO5             | Input<br>/Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.            |
| 19   | GPIO6             | Input<br>/Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.            |
| 20   | GPIO7             | Input<br>/Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.            |