

## High-sensitivity, high-resolution Scientific, Mini Optic Fiber Spectrometer

# ATP6500

### Features:

- ◇ Detector: back-thinned CCD, cooled down to  $-20\text{ }^{\circ}\text{C}$
- ◇ CCD parameters:  $1044 \times 64$  pixels
- ◇ Ultra-low noise CCD signal processing circuit
- ◇ Ultra-high dynamic range
- ◇ Ultra-low Etalon effect
- ◇ Quantum efficiency  $>90\%$
- ◇ Spectral range:  $180\text{-}1100\text{nm}$
- ◇ Spectral resolution:  $0.01\text{-}4\text{nm}$ (depend on spectral range, slit size)
- ◇ Optical path: crossed Czerny-Turner (C-T)
- ◇ Integration time:  $2\text{ms}\text{-}130\text{s}$
- ◇ power supply:  $\text{DC } 5\text{V} \pm 10\% @ <3\text{A}$
- ◇ 18 bit,  $570\text{KHz}$  A/D Converter
- ◇ Entrance connector : SMA905 connector or free space
- ◇ Output interface: high speed USB2.0 or UART
- ◇ 20 pins, dual rows programmable extension connector

### Application:

- ◇ Scientific research;
- ◇ Weak (biological) fluorescence measurement;
- ◇ Raman spectrometer;
- ◇ Microscale, fast spectrophotometer;
- ◇ Reflectance measurement;
- ◇ Transmittance measurement.

### Description:

Optosky ATP6500 Fiber Optic Spectrometer employs ultra-high performance,  $1044 \times 64$  pixel, back-thinned CCD with the widest dynamic range, semiconductor-cooled technology can reduce operating dark current, CCD cooled down to  $-20^{\circ}\text{C}$  under constant temperature. It greatly reduces sensor noise resulting in almost 2 times higher SNR than other competitors. It increases measuring reliability, and measuring result does not changed with temperature.

Built inside the customized ultra-low noise CCD signal processing circuit attributes to quantization noise less than 3 counts that are excel in the industry.

ATP6500 can receive lights via SMA905 connector or free space, and output spectral data via USB2.0/UART.

ATP6500 requires only  $5\text{V}$  DC supply, and convenient to integration.



### 3 Performance parameters

| Detector                |   |
|-------------------------|---|
| Type                    | back-thinned linear CCD (cooled down to -20°C)                |
| Spectral range          | 180-1100 nm   |
| Effective pixels        | 1044 x 64   |
| Pixel size              | 24µm × 24µm   |
| Full range              | ~600 ke-  |
| Sensitivity             | 6.5 uV/e-   |
| Dark noise              | 8 e-  |
| Optical parameters      |   |
| Wavelength range        | 180-1100 nm (available in custom wavelengths)                 |
| Resolution              | 0.01-1.3 nm (decide on slit size, spectral range)             |
| SNR                     | >1000:1   |
| Dynamic range           | >50000: 1   |
| Operating temperature   | -10 - 45 oC   |
| Operating humidity      | < 90%RH   |
| Optical path parameters |   |
| Optical path            | f/4 crossed C-T   |
| Confocal distance       | 98 mm for incidence / 107 mm for output                       |
| Entrance slit width     | 5,10,25,50,100,150,200 µm optional, available in custom width |
| Incident connector      | SMA905 connector or free space                                |
| Electrical parameters   |   |
| Integration time        | 8 ms – 30 minutes   |
| Data output interface   | USB 2.0   |
| ADC bit depth           | 18 bit (output 16bit)   |
| Power supply            | DC 5V±10%   |
| Operating current       | <3A   |
| Storage temperature     | -20°C to +70°C  |
| Operating temperature   | -10°C to +45°C  |
| Physical parameters     |   |
| Dimension               | 217×110×52 mm <sup>3</sup>                                    |
| Weight                  | 0.97 kg   |
| Sealing                 | Anti-sweat  |

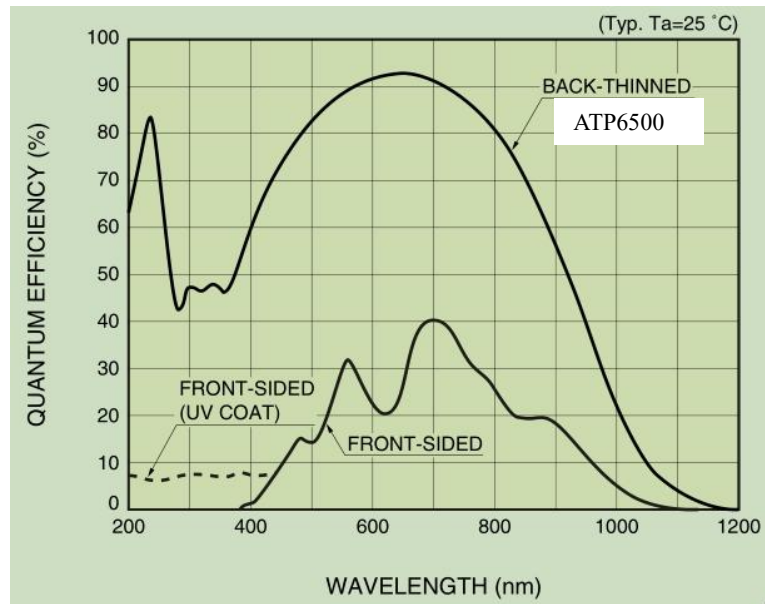


Fig 1 ATP6500 CCD employs 2 times higher quantum efficiency than normal CCD

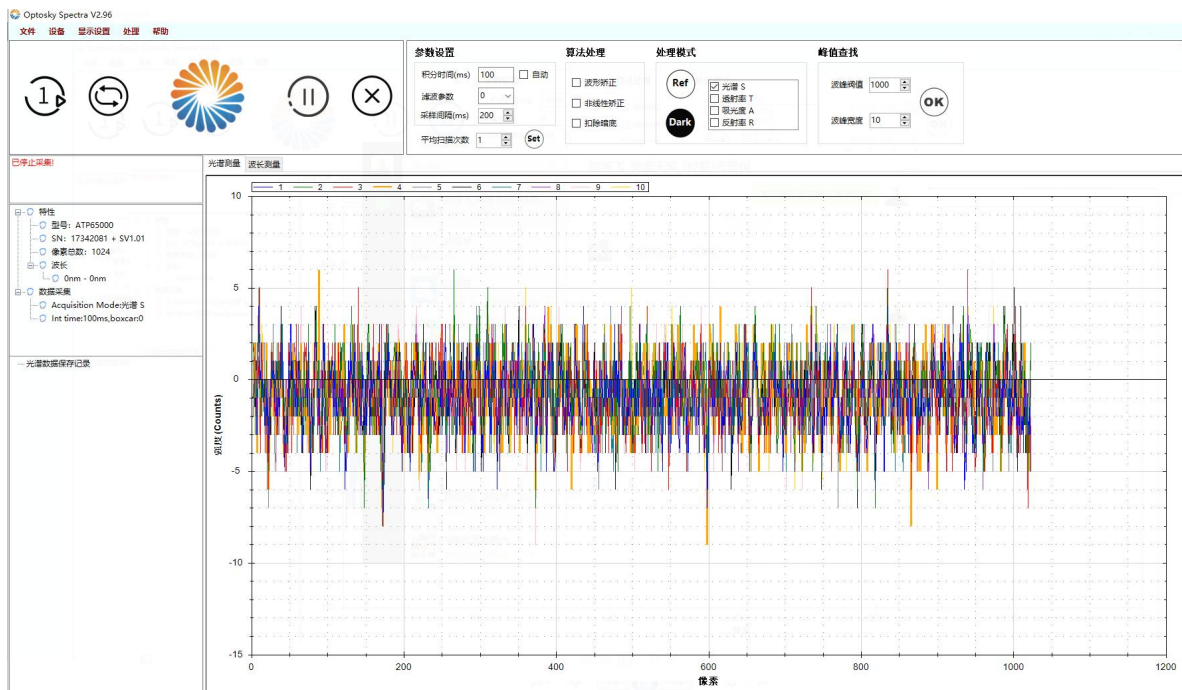


Fig 2 ATP6500 noise test (integration time is 100ms)

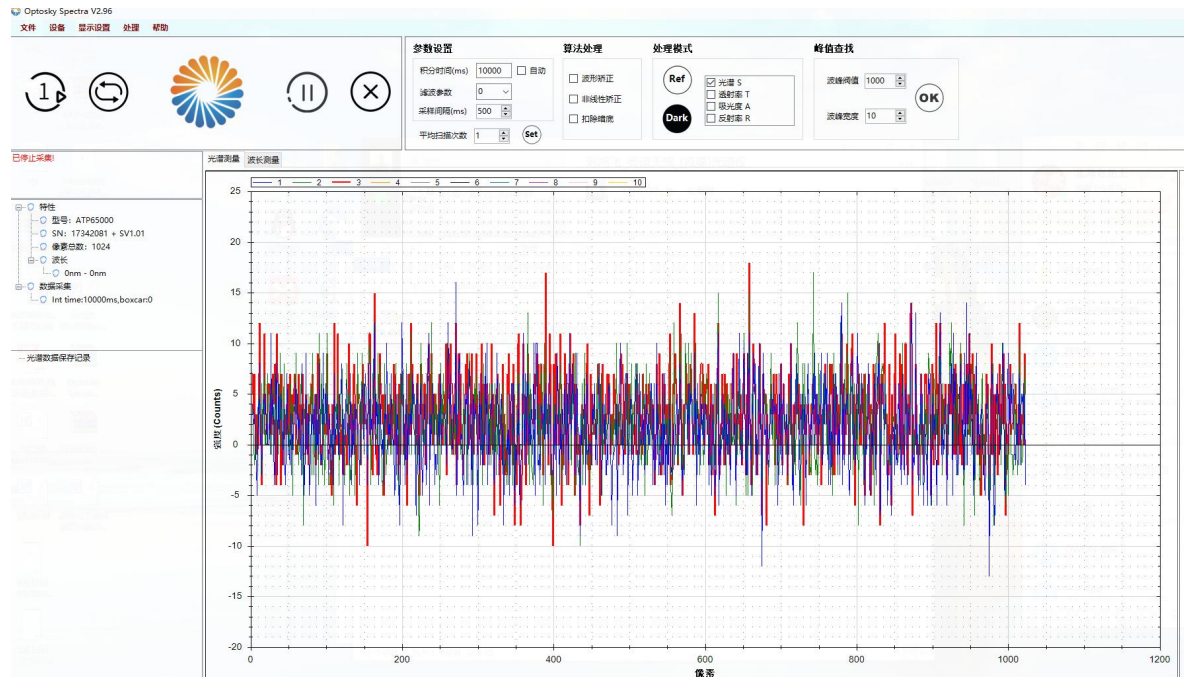


Fig 3 ATP6500 noise test (integration time is 10 s)

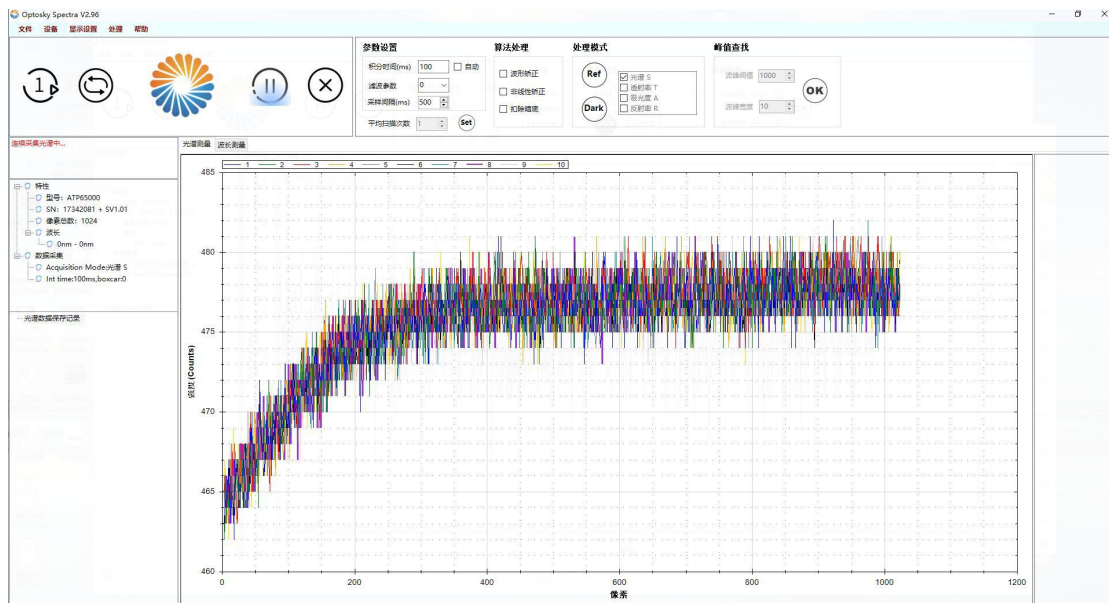


Fig 4 ATP6500 test result (integration time is 100ms), average dark current around 477, noise is 6 counts.



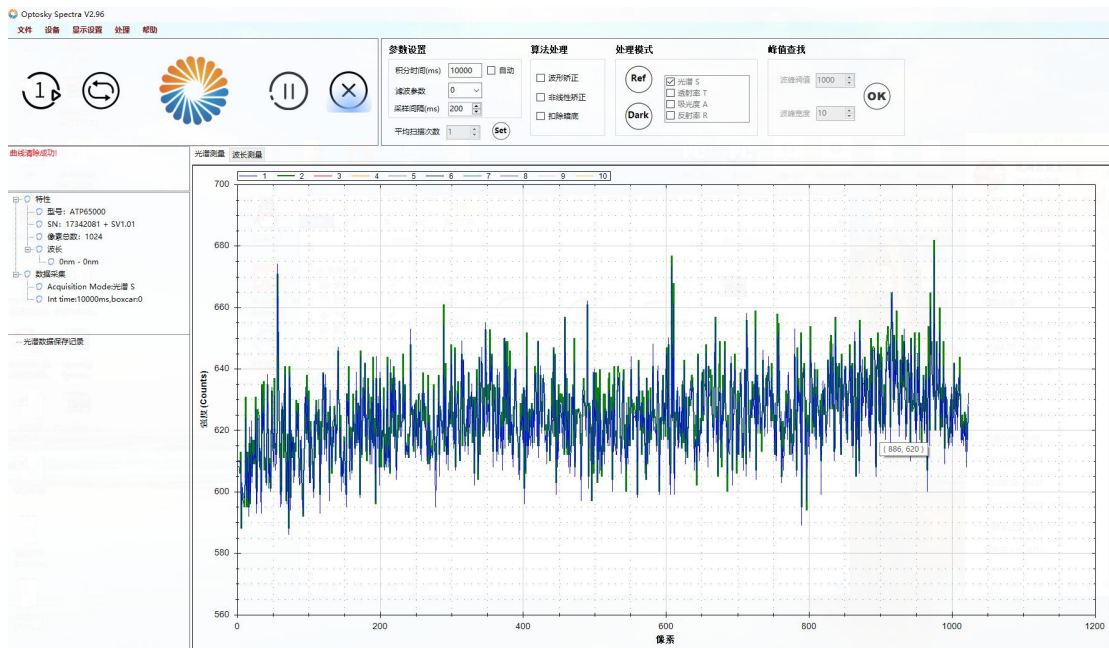


Fig 5 ATP6500 test result (integration time is 10s) , average dark current around 620, noise about 60 counts

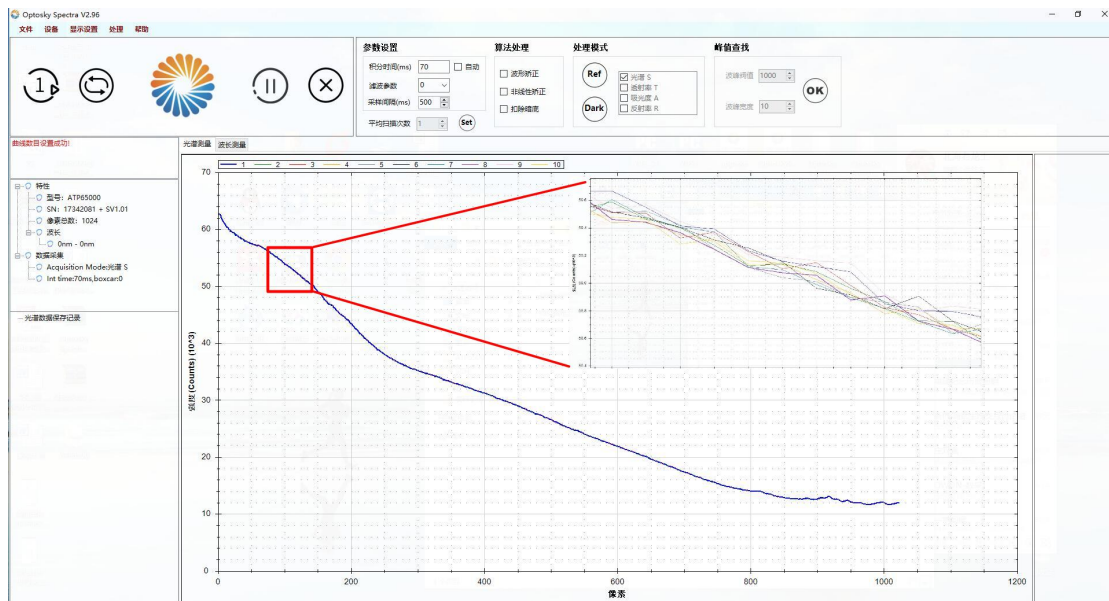


Fig 6 ATP6500 repeatability test (10 times), excellent repeatability!

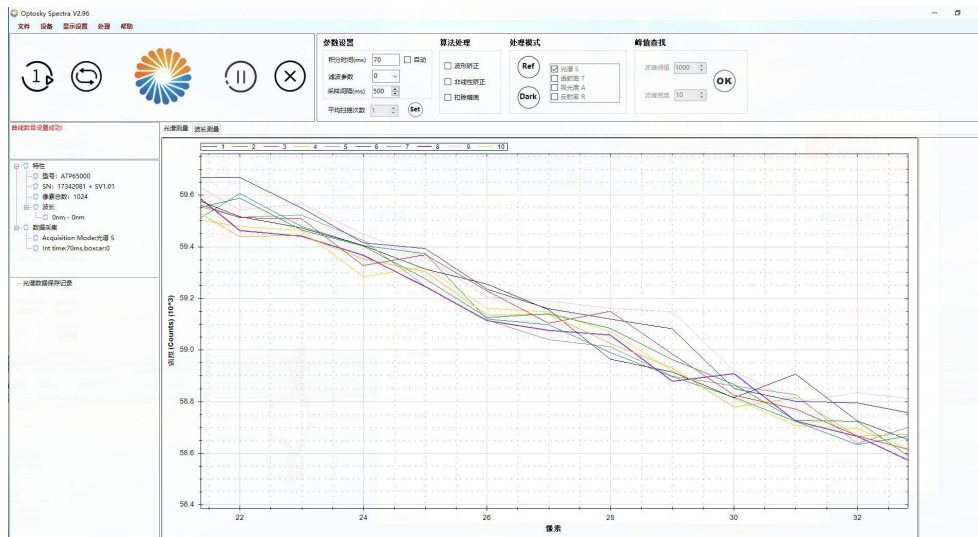
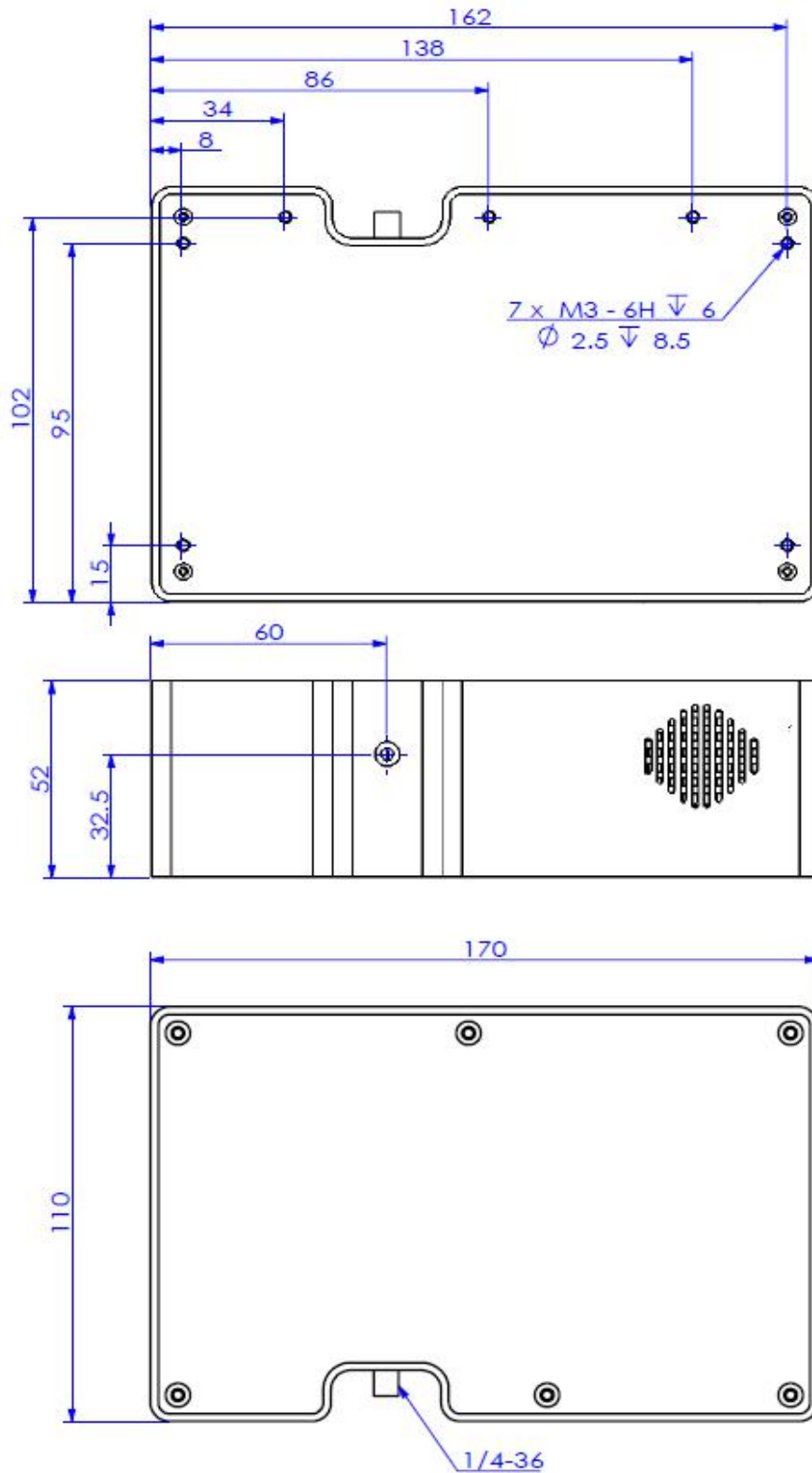


Fig 7 ATP6500 repeatability test result (10 times) ,enlarge the partial



## 4 Electrical Pin-out

Table 1 Electrical Characteristics

| Parameter  | Min  | Typ | Max  | Unit |
|--|------|-----|------|------|
| <b>Power Supply</b>                                  |      |     |      |      |
| Operating voltage range                              | 4.5  | 5   | 5.5  | V    |
| Operating current                                    | 170  | 500 | 2000 | mA   |
| <b>Logic Inputs(3.3V LVTTTL, Five-volt tolerant)</b> |      |     |      |      |
| High level input voltage                             | 1.7  |     | 3.6  | V    |
| Low level input voltage                              | -0.3 |     | 1.0  | V    |
| <b>Logic Output(3.3V LVTTTL)</b>                     |      |     |      |      |
| High level output voltage                            | 2.4  |     |      | V    |
| Low level output voltage                             |      |     | 0.4  | V    |

The module is equipped with a 20-pin male angled box header(2x10, 2.00 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.

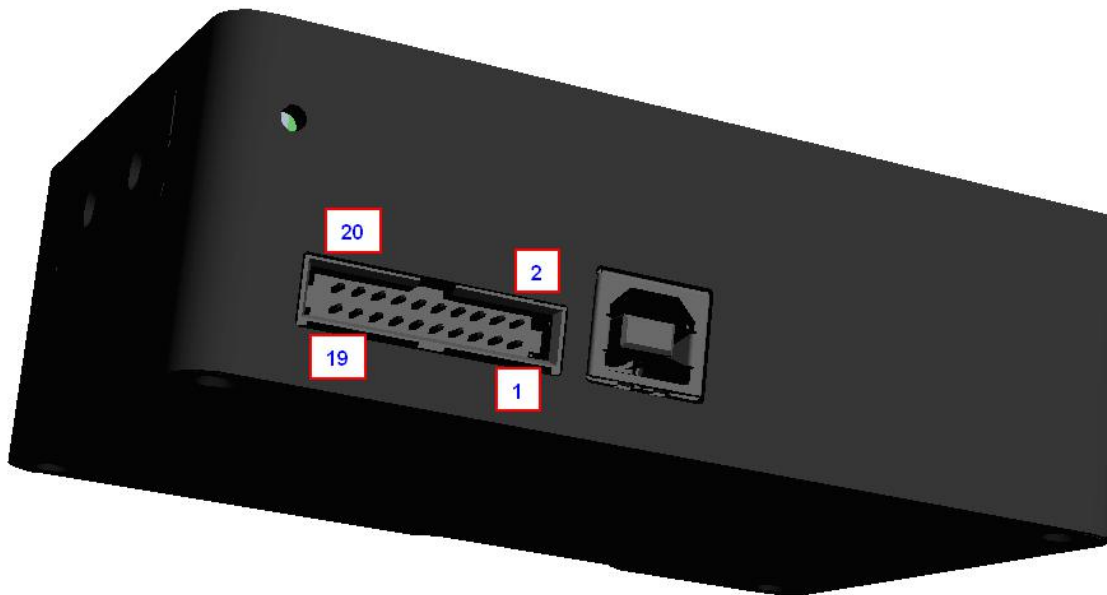


Table 2 Electrical Pin-Out

| 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 | LVTTTL output the lamp enable signal. |



|    |                   |               |   |
|----|-------------------|---------------|---|
| 6  | Continuous_strobe | Output        | LVTTTL output the continues strobe signal.  |
| 7  | Ext_trigger_in    | Input         | LVTTTL input the trigger signal.  |
| 8  | Single_strobe     | Output        | LVTTTL 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 /Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTTL Logic.           |
| 14 | GPIO1             | Input /Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTTL Logic.           |
| 15 | GPIO2             | Input /Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTTL Logic.           |
| 16 | GPIO3             | Input /Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTTL Logic.           |
| 17 | GPIO4             | Input /Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTTL Logic.           |
| 18 | GPIO5             | Input /Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTTL Logic.           |
| 19 | GPIO6             | Input /Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTTL Logic.           |
| 20 | GPIO7             | Input /Output | General Purpose Software Programmable Digital Inputs/Outputs, LVTTTL Logic.           |

## 5 Order Guide

Order number Rules:

| Model   | Spectral region  |                 | Slit width |
|---------|------------------|-----------------|------------|
| ATP6500 | Short wavelength | Long wavelength | Slit width |

For example:

What to buy atp6500, spectral region: 200-850nm, slit width is 50 um, then the order no is:

**atp6500-200-850-050**

| Order No | Spectral region (nm) | Slit |
|----------|----------------------|------|
|----------|----------------------|------|

# Datasheet

|                      |          |               |  |
|----------------------|----------|---------------|--|
| atp6500-200-400-###  | 200~400  | 10 μm         |  |
| atp6500-200-850-###  | 200~850  | 25 μm         |  |
| atp6500-200-1100-### | 200~1000 | 50 μm         |  |
| atp6500-340-850-###  | 340~850  | 100 μm        |  |
| atp6500-600-1100-### | 600~1100 | 200 μm        |  |
| atp6500-800-1000-### | 800-1000 | Other: _____μ |  |
| atp6500-300-1100-### | 300-1100 | m             |  |
| atp6500-###-###-###  | Other    |               |  |



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