

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

### **ATP5020P**

#### **Feature:**

- Detector: Back-thinned illuminated CCD (cooled to -10C).
- Pixels: 2048 pixels
- UV or NIR response enhanced optimization:
- UV response enhanced: ATP5020P
- NIR response enhanced: ATP5020R
- Low noise CCD signal processing circuit
- Max. Wavelength Range: 180-1180 nm
- (depends on specific requirements)
- Optical Sensitivity: 0.01-3 nm
- (Depends on range and slit).
- Optical Path: Crossed C-T.
- Integration Time: 6ms-30 min.
- 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:**

ATP5020P is a new 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 measurement 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 ATP5020P can receive SMA905 fiber optic input or free-space light to output spectral data via USB2.0 or UART port.

The ATP5020P connects to 5V DC power supply, easy-to-integrate to wide industrial spectroscopy application.

Model	Features	
ATP5020P	2048 pixels, cooled -10°C	
ATP5020R	NIR enhanced, 2048 pixels, cooled -10°C	



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Fruit Sorting.



# **1 PARAMETER**

DETECTOR			
Model	TE-cooled back-illuminated linear array CCD (cooling to -5C)		
Spectrum Range	180-1180 nm		
Effective Pixels	2048 pixels		
Pixel size	14μm×14μm		
Full well capacity	~600 ke <sup>-</sup>		
CCD node Sensitivity	6.5uV/e-		
Readout noise	6e-		
OPTICAL PARAMETER			
Wavelength Range	180-1100 nm depends on specific application		
Optical Resolution	0.01-3 nm (Depend on range & slit)		
SNR	> 900:1		
Dynamic Range	10000: 1		
Working T	-10-45 °C		
OPTICAL PATH			
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 PARAMETE	RS		
Integration Time	6 ms - 30 min		
Data output interface	USB 2.0		
ADC	18 bit (Workable Output 16bit)		
Supply Voltage	DC 5V±10%		
Working current	<2.3A		
Storing Temp	-20°C to +70°C		
Working Temp	-10°C to +45°C		
PHYSICAL			
Size	217×110×52 mm		
Wight	1.6 kg		
Sealing	Anti-sweat		





### 2 ATP5020P vs ATP5020R



Wavelength (nm)



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# **3** Mechanical Diagrams





Fig 2 Dimension

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# **4** Electrical Pin-out

Table 1 Electrical Characteristics
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Parameter	Min	Тур	Max	Unit
Power Supply				
Operating voltage range	4.5	5	5.5	V
Operating current	170	500	2000	mA
Logic Inputs(3.3V LVTTL,				
Five-volt tolerant)				
High level input voltage	1.7		3.6	V
Low level input voltage	-0.3		1.0	V
Logic Output(3.3V LVTTL)				
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	1	Power Supply, 5V±0.5,		
2	GND	1	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_i n	Input	LVTTL input the trigger signal.		
8	Single_strob e	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		
<mark>1</mark> 1	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, LVTTL Logic.		
14	GPIO1	Input /Output	General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.		
45	CDIO2	Input	General Purpose Software Programmable Digital		
15	GPIUZ	/Output	Inputs/Outputs, LVTTL Logic.		
16	CPIO2	Input	General Purpose Software Programmable Digital		
10	GFIUS	/Output	Inputs/Outputs, LVTTL Logic.		
17	GPIO4	Input	General Purpose Software Programmable Digital		

		/Output	Inputs/Ou	tputs, LVTT	L Logic.		
		Input	General	Purpose	Software	Programmable	Digital
10	GPI05	/Output Inputs/Outputs, LVTTL Logic.					
10	CDIOS	Input	General	Purpose	Software	Programmable	Digital
19	GPIOO	/Output	Inputs/Outputs, LVTTL Logic.				
20	0007	Input	General	Purpose	Software	Programmable	Digital
20	GPIOT	/Output	Inputs/Ou	tputs, LVTT	L Logic.		



# **5** Order Guide

Order number Rules:

Model	Spectral region		Slit width	
ATP5020P	Shortwavelength	Longwavelength	Slit width	

For example:

What to buy ATP5020P, spectral region: 200-1000nm, slit width is 50 um, then the order no is:

#### ATP5020P-200-1000-050

Order No	Spectral region	Slit
ATP5020P-200-400-###	200~400	10 μm
ATP5020P-200-850-###	200~850	25 μm
ATP5020P-200-1100-###	200~1000	50 μm
ATP5020P-340-850-###	340~850	100 μm
ATP5020P-600-1100-###	600~1100	200 µm
ATP5020P-###-####	Other	Other:µm