DataSheet

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

OPTO-5020P

Feature:

- Detector: Back-thinned illuminated CCD (cooled to -10C).
- Pixels: 2048 pixels
- UV or NIR response enhanced optimization:
- UV response enhanced: OPTO5020P
- NIR response enhanced: OPTO5020R
- Low noise CCD signal processing circuit
- Max. Wavelength Range: 180-1180 nm
- (depends on specific requirements)
- Optical Sensitivity: 0.2-3 nm
- (Depends on range and slit).
- Optical Path: Crossed C-T.
- Integration Time：10ms-65s.
- 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:

OPTO-5020P 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..

OPTO-5020P can receive SMA905 fiber optic input or free-space light to output spectral data via USB2.0 or UART port.
The 5020P connects to 5V DC power supply,easy-to-integrate to wide industrial spectroscopy application.

Model	Features
OPTO-5020P	2048 pixels, cooled -10℃
OPTO-5020R	NIR enhanced, 2048 pixels, cooled -10℃

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$^-$
CCD node Sensitivity	6.5uV/e-
Readout noise	6e-
OPTICAL PARAMETER	
Wavelength Range	180-1100 nm depends on specific application
Optical Resolution	0.2-3 nm (Depend on range & slit)
SNR	> 900:1
Dynamic Range	10000：1
Working T	-10-45 ℃
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 PARAMETERS	
Integration Time	10ms - 65s
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 OPTO-5020P vs OPTO-5020R

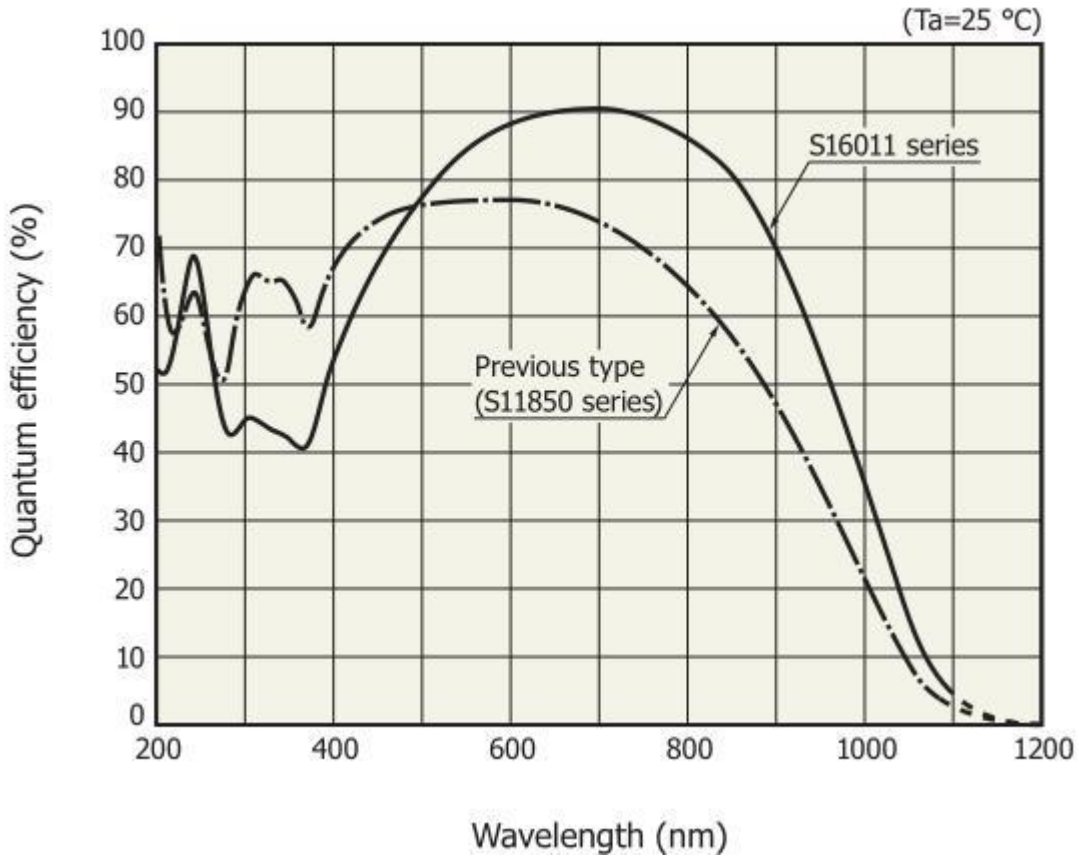
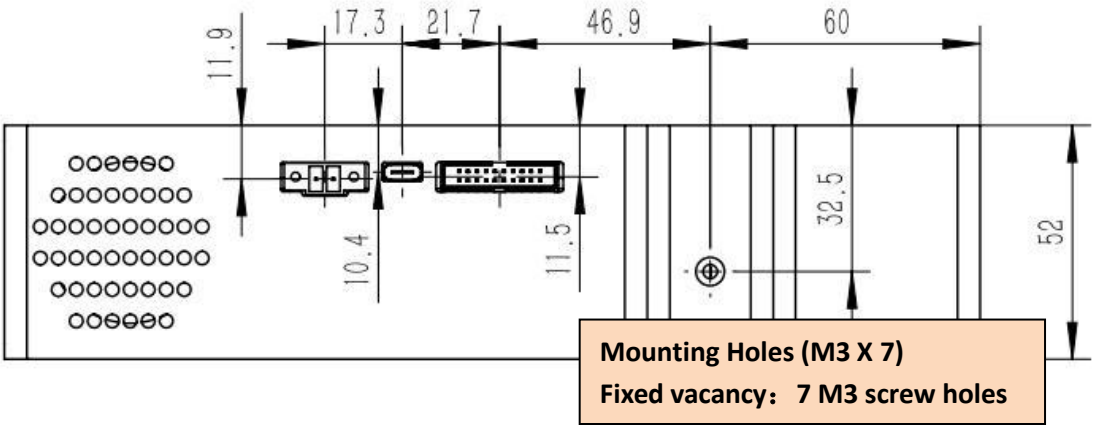


Fig 1

5020R is designed to enhance NIR response,
the higher NIR response in the rear range >500 nm,
5020P is designed to enhance UV response,
the higher UV response in the front range <500 nm.

3 Mechanical Diagrams



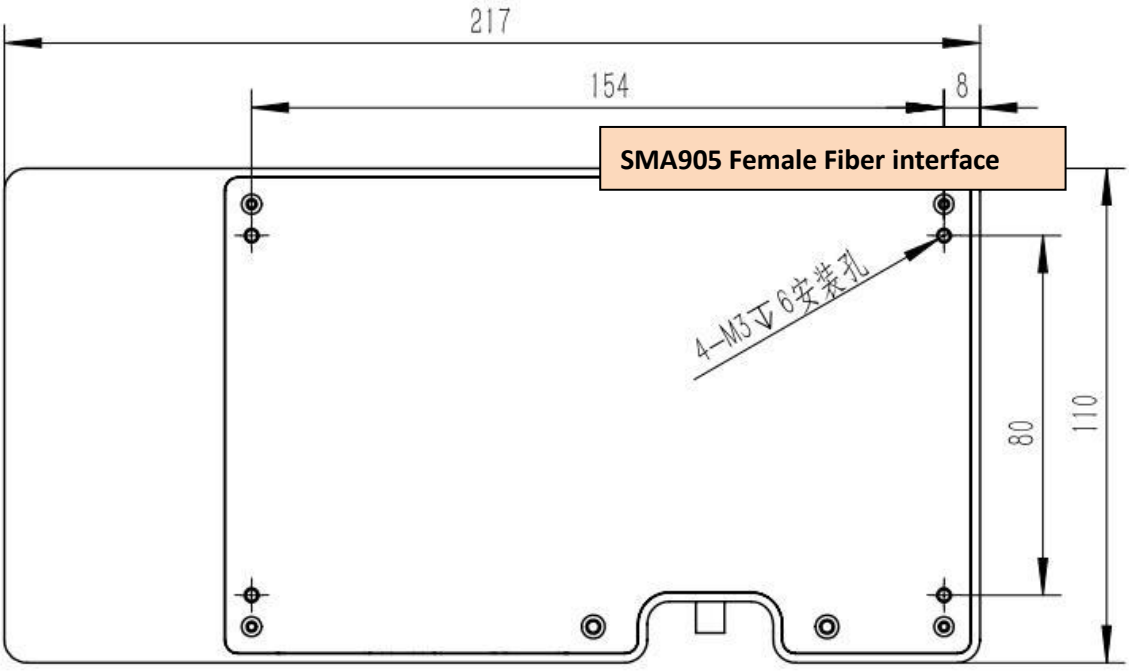


Fig 2 Dimension

4 Electrical Pin-out

Table 1 Electrical Characteristics

Parameter	Min	Typ	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	/	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 /Output	General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.
14	GPIO1	Input /Output	General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.
15	GPIO2	Input /Output	General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.
16	GPIO3	Input /Output	General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.
17	GPIO4	Input	General Purpose Software Programmable Digital
		/Output	Inputs/Outputs, LVTTL Logic.
18	GPIO5	Input /Output	General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.
19	GPIO6	Input /Output	General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.
20	GPIO7	Input /Output	General Purpose Software Programmable Digital Inputs/Outputs, LVTTL Logic.

5 Order Guide

Order number Rules:

Model	Spectral region		Slit width	
OPTO-5020P	Shortwavelength	Longwavelength	Slit width	

For example:

What to buy ATP5020P, spectral region: 200-1100nm, slit width is 50 um, then the order no is:

OPTO-5020P-200-1000-050

Order No	Spectral region	Slit	
OPTO-5020P-200-400-###	200~400	10 μm	
OPTO-5020P-200-850-###	200~850	25 μm	
OPTO-5020P-200-1100-###	200~1000	50 μm	
OPTO-5020P-340-850-###	340~850	100 μm	
OPTO-5020P-600-1100-###	600~1100	200 μm	
OPTO-5020P-###-###-###	Other	Other:_____μm	