



# Datasheet

<b>High-Sensitivity &amp; High Resolution Miniature Micro Spectrometer</b>	<b>EOC-SI-5020/EOC-SI-5040</b>
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### Feature:

- ✧ Detector: back-thinned CCD, cooled down to -20 °C
- ✧ CCD parameters: 2048×64pixel, 14×200um
- ✧ Ultra-low noise CCD signal processing circuit
- ✧ Spectral range: 180-1150nm
- ✧ Spectral resolution: 0.1-2 nm(depend on spectral range, slit width)
- ✧ Optical path: crossed Czerny-Turner (C-T)
- ✧ Integration time: 2ms-130s
- ✧ power supply: DC 5V±10% @ <2.3A
- ✧ 18 bit, 570KHz 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:

- ✧ Raman spectrometer
- ✧ Micro spectrophotometer,
- ✧ high speed spectrophotometer
- ✧ Spectral analysis /radiation spectrophotometer/  
spectrophotometric analysis
- ✧ Transmittance, absorbance, reflectance detection
- ✧ UV-, VIS-, shortwave NIR-Wavelength detection
- ✧ LIBS

### Description:

EOC-SI-5020/5040 Miniature Fiber Optic Spectrometer employs the ultra-high performance, 2048 x 64 pixel, semiconductor-cooled, back-thinned CCD array, down to -20°C. It greatly reduces sensor noise resulting in almost 2 times higher SNR than other competitors. It increases measuring reliability, and measuring results are not changed by temperature.

EOC tailor-designs ultra-low noise CCD signal processing circuit inside, resulting in first-class quantitative noise that is lower than 3 counts.

EOC-SI-5020 is designed with SMA905 fiber optic entrance connector or free space, and it outputs spectrum data via USB2.0/UART

Item	Pixels	Cooled down to
<b>EOC-SI-5020</b>	2048pixels	-20°C
<b>EOC-SI-5040</b>	4096pixels	-20°C



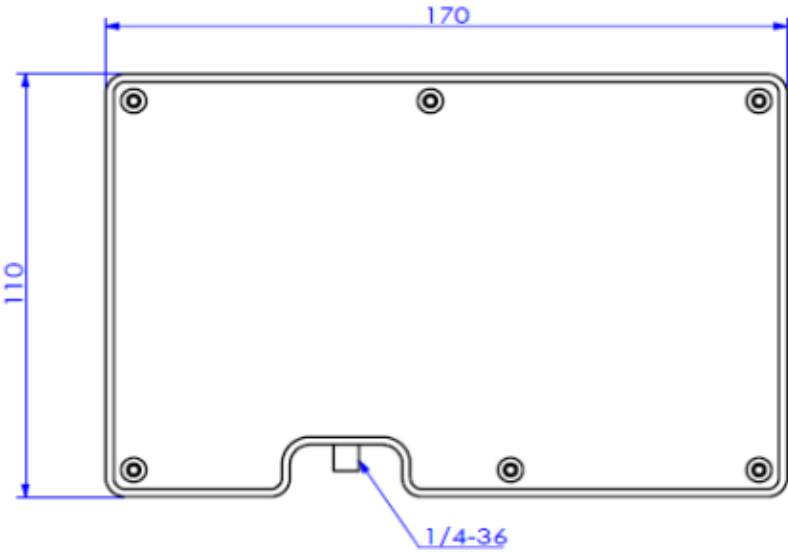
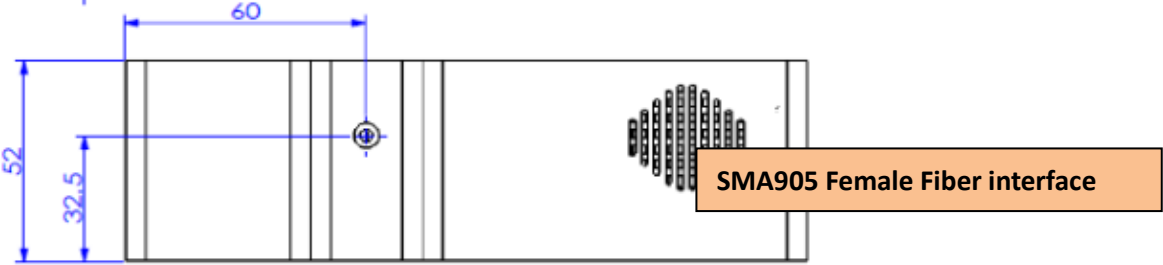
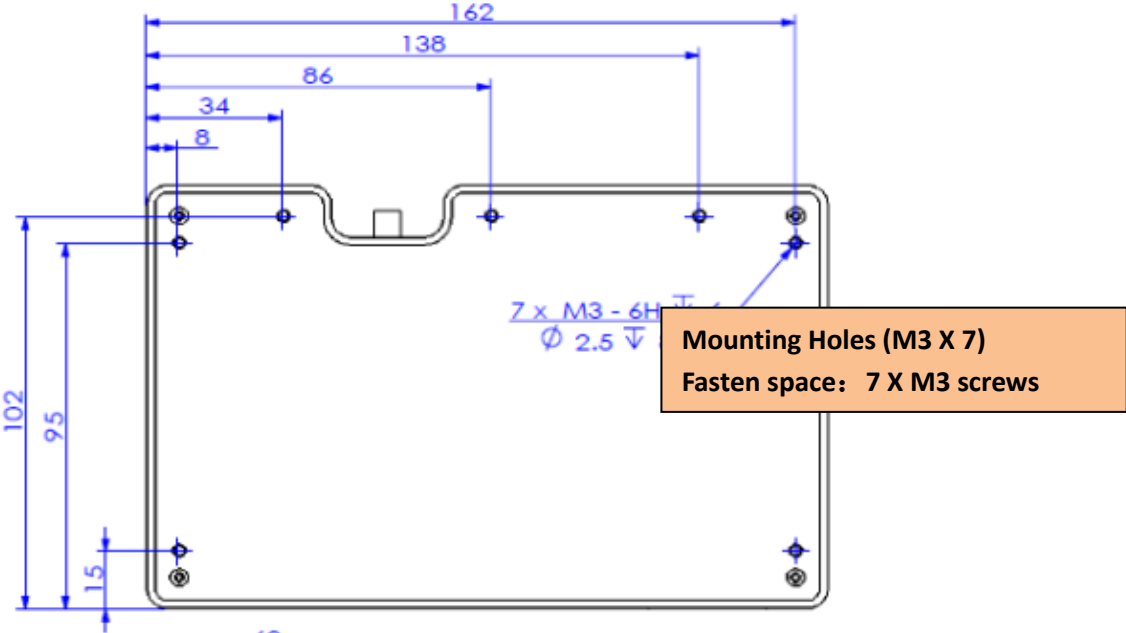
# Datasheet

## Performance parameters:

Detector	
Type	TE-cooled, back-thinned CCD array, cooled down to -20°C)
Spectral range	165-1180 nm
Effective pixels	2048×64
Pixel sizes	14μm×200μm
Full range	~200 ke-
Sensitivity	6.5 uV/e-
Dark noise	6 e-
Optical parameters	
Wavelength range	180-1180 nm
resolution	0.02-2 nm (depend on slit, spectral range)
SNR	>8000:1
Dynamic range	10000: 1
Operating temperature	-10-40 °C
Operating humidity	< 85%RH
Optical parameters	
Optical path	f/4 crossed Czerny-Turner (C-T)
Focal	77.5 mm for incidence / 111.6 mm for output
Entrance slit width	5、 10、 25、 50、 100、 150、 200 μm (optional) Available in customized other widths
Entrance connector	SMA905 Fiber optic connector, free space
Electrical parameters	
Integration time	1 ms - 130 second
Data output port	USB 2.0
ADC in-depth	18 bit (Actual output 16bit)
Power supply	DC 5V±10%
Operating current	<2.3A
Storage temperature	-20°C to +70°C
Operating temperature	-10°C to +40°C
Physical parameters	
Size	170×110×52 mm <sup>3</sup>
Weight	1.3 kg
Sealing	Anti-sweat

# Datasheet

## 2 Mechanical Diagrams



# Datasheet

## 3 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 LVTTL, 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 LVTTL)</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.

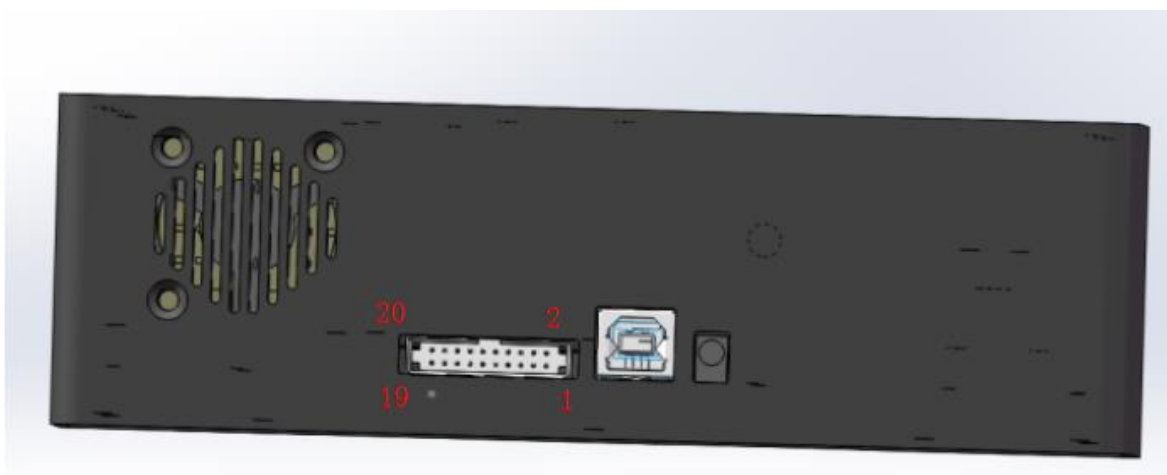


Table 2 Electrical Pin-Out

Pin#	Description	I/O	Function Description
1	VCC	/	Power Supply, 5V±0.5,
2	GND	/	Ground

# Datasheet

3	UART_TX	Output	UART Transmit signal
4	UART_RX	Input	UART Receive signal
5	LD_Control	Output	LVTTTL output the LD enable signal.
6	NC	/	Remained to define.
7	LD_Trigger_in	Input	LVTTTL output the LD trigger signal.
8	NC	/	Remained to define.
9	LD_TX	Output	LD UART Transmit signal
10	NC	/	Remained to define.
11	LD_RX	Input	LD UART Receive signal
12	NC	/	Remained to define.
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.

## 4 Order Guide

Order number Rules:

Model	Spectral region		Slit width	
EOC-SI-5020	Short wavelength	Long wavelength	Slit width	

For example:

What to buy EOC-SI-5020, spectral region: 200-850nm, slit width is 50 um, then the order no is:

**EOC-SI-5020-200-850-050**

# Datasheet

Order No	Spectral region	Slit	
EOC-SI-5020-200-400-###	200~400	10 $\mu\text{m}$	
EOC-SI-5020-200-850-###	200~850	25 $\mu\text{m}$	
EOC-SI-5020-200-1100-###	200~1000	50 $\mu\text{m}$	
EOC-SI-5020-340-850-###	340~850	100 $\mu\text{m}$	
EOC-SI-5020-600-1100-###	600~1100	200 $\mu\text{m}$	
EOC-SI-5020-###-###-###	Other	Other: _____ $\mu\text{m}$	