

Spectrometer for everybody



Pleroma is a **spectrometer** integrated with optical MEMS chip and an image sensor developed by **Spectrochip Inc.**. Light to be measured is guided into the entrance port of Pleroma (e.g. through an optical fiber) and the spectrum measured with the built-in image sensor is output from the CSI port for data acquisition. Pleroma allow accurate measurement with low noise.

Pleroma comes with evaluation software and **Python** source code that allows settings of measurement conditions, acquiring and saving data, and displaying graphs. Pleroma is designed to take full advantage of open-source feature of **Raspberry Pi Single Board Computer (SBC)** - the most widely distributed SBC - for quick and easy customization of user applications.

➤ Features

- Flat-field micro concave grating chip
- Highly accurate optical characteristics
- Direct connection to Raspberry Pi SBC
- Python source code available
- Compact design for easy integration

➤ Applications

- Spectrophotometer
- Component analysis in food, agriculture, etc.
- Process control for chemical products
- Water content measurement
- Chromogenic reader

➤ Spectral

Item	Specification	Unit
Spectral dispersion principle	Flat-field* ¹ micro concave grating chip	-
Spectral range	300 ~ 1000	nm
Spectral resolution (FWHM)	Typ.	5
	Max.	7
Wavelength reproducibility	±0.375	nm
Stray light* ²	0.04	%

*1: Flat-field focusing is achieved by aberration-corrected concave grating design.

*2: Stray light is measured using an image sensor with 12-bit A/D conversion.

➤ Electrical

Item	Specification	Unit
A/D conversion	8	bits
Integration time (shutter)	0 ~ 1,000,000	μs
Total noise level ^{*3,4}	1.1	%
Interface ^{*5}	CSI camera connector	-
Power consumption	158	mW

*3: Electrical noise of this image sensor with 8-bit A/D conversion is 1.1%. Using an image sensor with more bit number of A/D conversion will greatly increase the signal-to-noise ratio.

*4: The total noise level is the Gaussian sum of the electrical noise and the optical noise (stray light).

*5: Connected to Raspberry Pi SBC.

➤ Mechanical / Optical

Item	Specification	Unit
Dimensions (W × D × H)	Module with Stand	44.00 × 47.28 × 26.25
	Module	44.00 × 35.60 × 11.60
Weight (including optical fiber stand)	12	g
Image sensor type	OV9281	-
Number of spectral pixels	1,280	pixel
Input optical solid angle	24	degree
Connector for optical fiber	SMA905	-

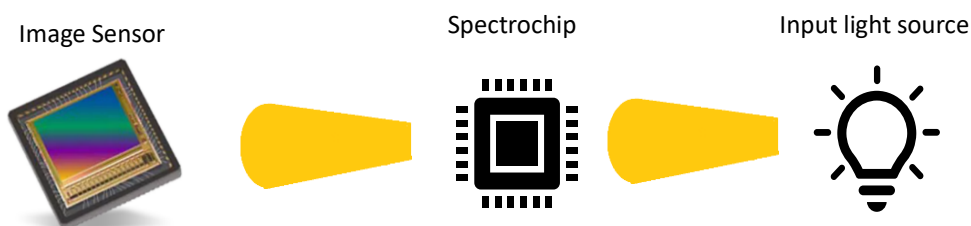
➤ Temperature

Item	Specification	Unit
Operating temperature ^{*6}	+5 ~ +35	°C
Storage temperature	-20 ~ +70	°C

*6: No dew condensation. When there is a temperature difference between a product and the surrounding area in high humidity environment, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability.

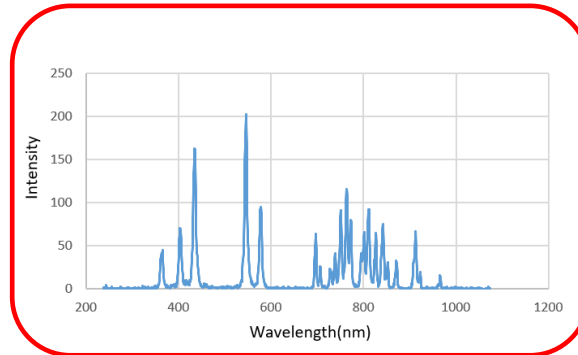
➤ Optical Component Layout

Pleroma Spectrometer uses a micro concave grating chip, making it possible to deliver high throughput and highly accurate optical characteristics.



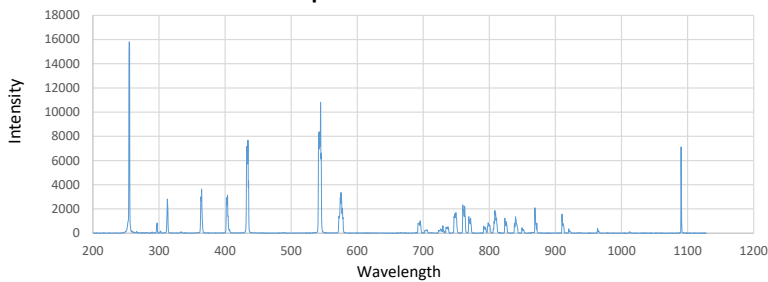
➤ Hg-Ar Lamp Spectrum

Pleroma Spectrometer – Raspberry Pi Version

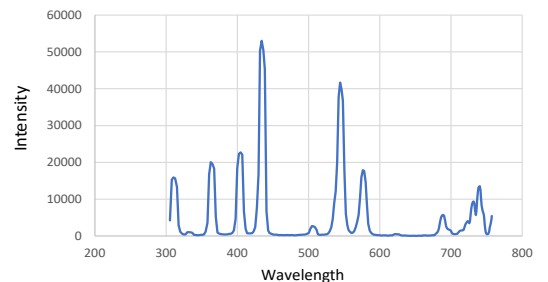


Other Brands

Ocean Optics – HR4000CG-UV-VIS

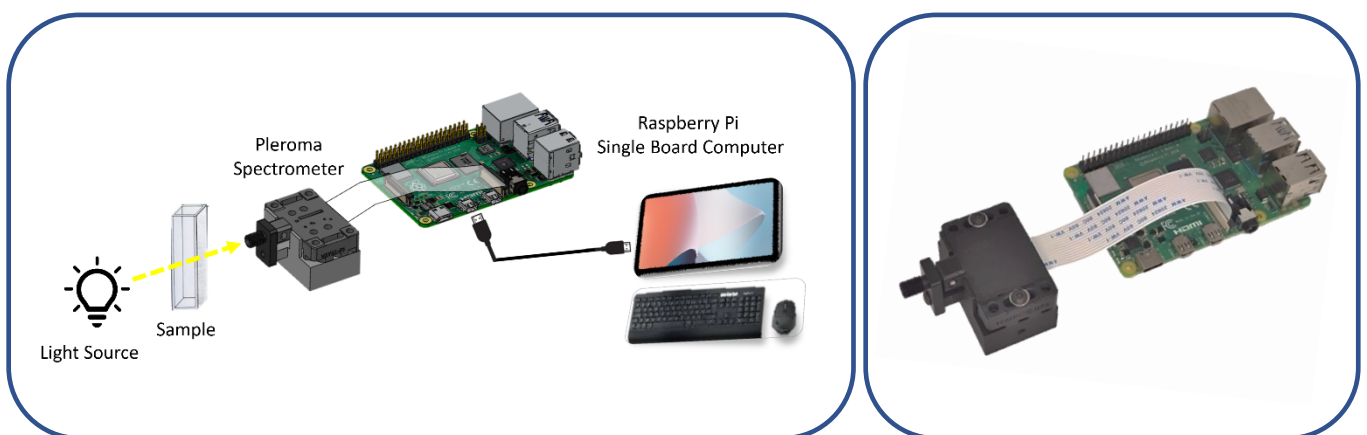


Hamamatsu – C12666MA



➤ Application Example: Transmission Measurement

Light to be measured is guided into the entrance port of **Pleroma Spectrometer** through the sample and the acquired spectrum is output via the CSI port to a Raspberry Pi SBC. There are no moving parts inside the unit, so stable measurements are always obtained.

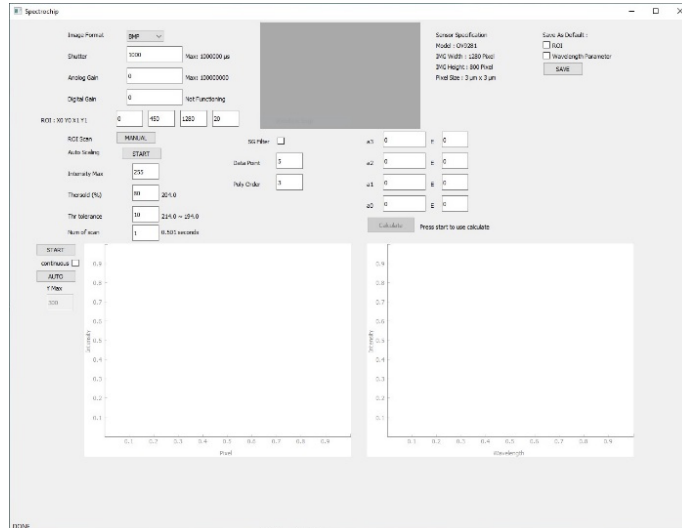


➤ Tool Kit

Software, source code, user manual, and CAD files can be downloaded at the following link:

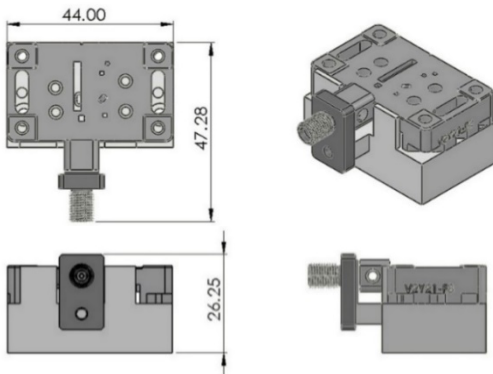
<https://github.com/SpectroChip/spectrochip.git>

If you need any support, please email to service@spectrochips.com.

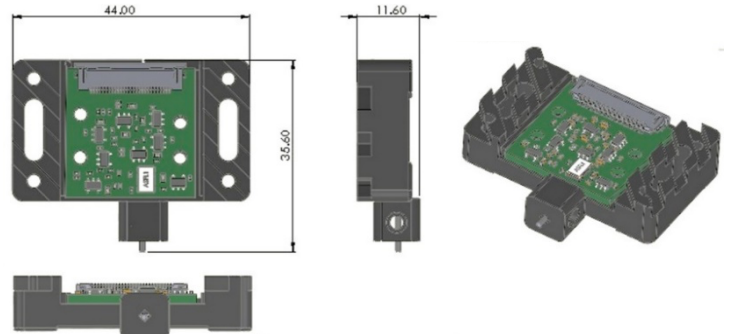


➤ Dimension (unit: mm)

Pleroma with SMA905 Connector



Pleroma Spectrometer



Information described in this material is current as of December 2022.

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