

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	nm
	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	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 signal-to-noise ratio.

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

➤ Mechanical / Optical

Item	Specification	Unit
Dimensions (W × D × H)	Module with Stand	44.00 × 42.78 × 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	-

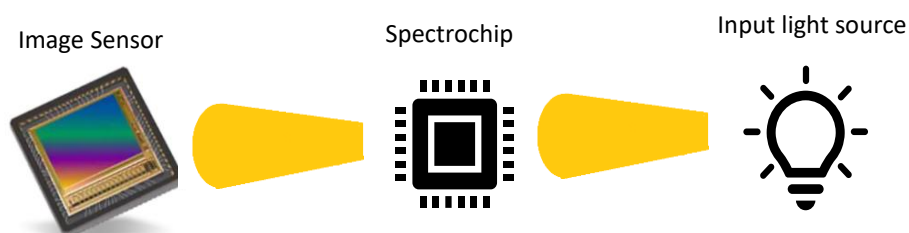
➤ Temperature

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

*5: 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.

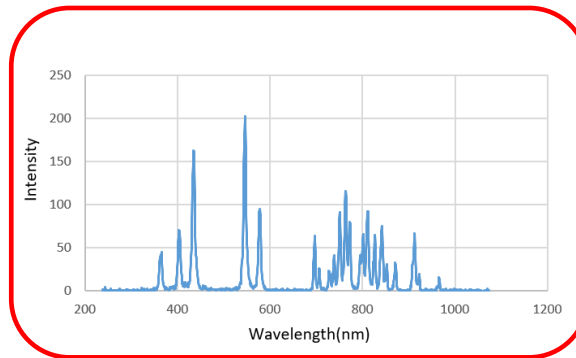
➤ Optical Component Layout

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



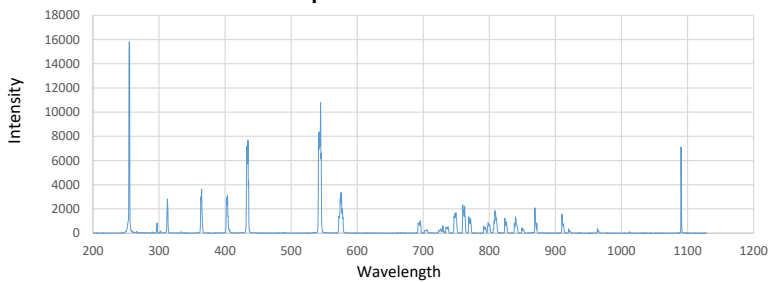
➤ Hg-Ar Lamp Spectrum

Pleroma Spectrometer – Raspberry Pi Version

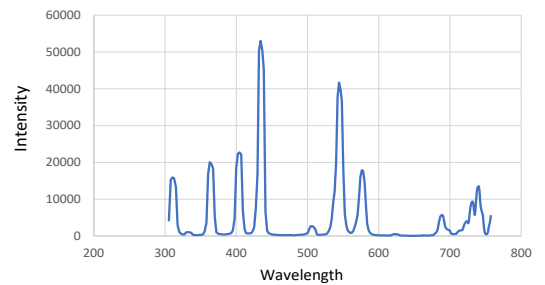


Other Brands

Ocean Optics – HR4000CG-UV-VIS

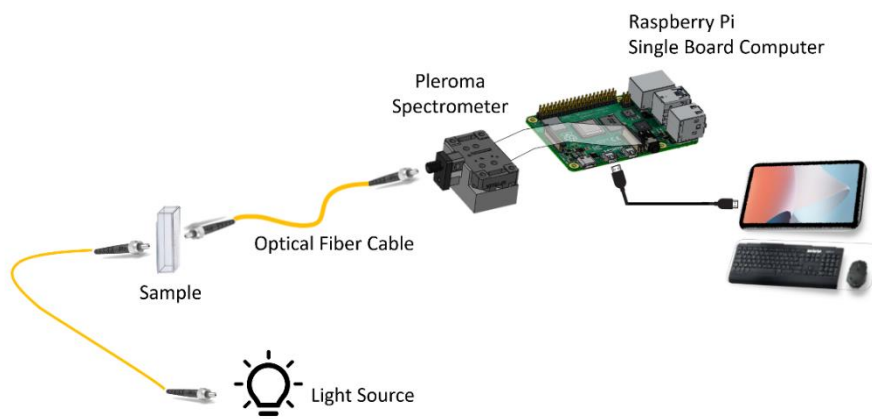


Hamamatsu – C12666MA



➤ Application Example: Transmission Measurement

Light to be measured is guided into the entrance port of **Pleroma Spectrometer** through an optical fiber and the spectrum measured with the built-in image sensor is output through the CSI port to a Raspberry Pi for data acquisition. There are no moving parts inside the unit so stable measurements are obtained at all times. An optical fiber that guides light input from external sources allows a flexible measurement setup.

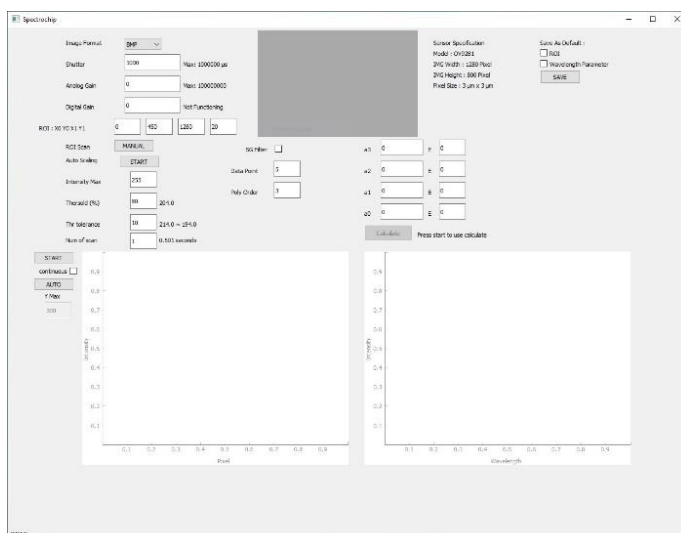


➤ Tool Kit

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

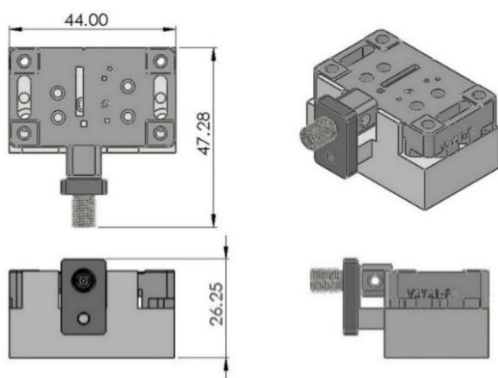
<https://github.com/SpectroChip/spectrochip.git>

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

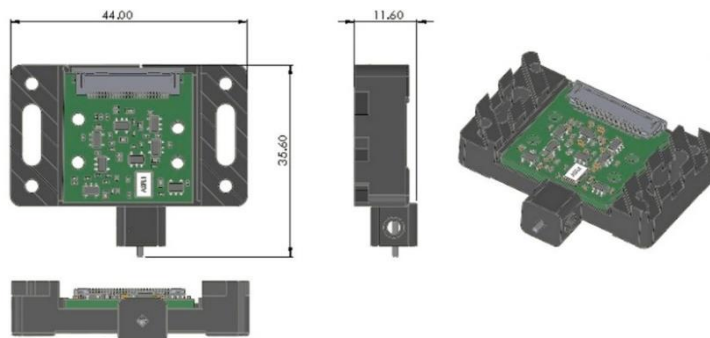


➤ Dimension (unit: mm)

Pleroma with SMA905 Connector



Pleroma Module



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

Product specifications are subject to change without prior notice due to improvements or other reasons. This document has been carefully prepared and the information contained is believed to be accurate. In rare cases, however, there may be inaccuracies such as text errors. Before using these products, always contact us for the delivery specification sheet to check the latest specifications. The product warranty is valid for one year after delivery and is limited to product repair or replacement for defects discovered and reported to us within that one year period. However, even if within the warranty period we accept absolutely no liability for any loss caused by natural disasters or improper product use. Copying or reprinting the contents described in this material in whole or in part is prohibited without our prior permission.



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