

# PMA-12

## Photonic multichannel analyzer

Highly sensitive spectrophotometric device  
that combines a spectrometer  
and a photodetector



The PMA-12 is a compact spectral measurement system that combines a spectrometer and optical detector into one unit. Because of the high sensitivity, spectra can easily be obtained in many applications, just by bringing the optical fiber close to the sample without the connection to a special light collection system. Since the spectrometer and photo-detector are manufactured with high machine accuracy, the PMA-12 is stable and can be used with confidence for long periods of time. The wavelength axis and spectral response characteristics are already calibrated, so spectral measurements can be carried out easily and accurately.

### Scientific applications

- UV to visible spectroscopy
- Fluorescence spectroscopy
- Luminous efficiency measurement
- Chemiluminescence analysis
- Liquid chromatography
- Gas chromatography
- Raman scattering
- Discharge spectrum analysis
- Combustion analysis
- Micro spectroscopy

### Industrial applications

- Water quality testing
- Evaluation of light emitting devices and light sources
- Photobiological safety assessment
- Impurities testing
- Film thickness measurements
- UV radiation measurements
- Plasma monitoring
- Chromaticity measurements
- Combustion monitoring
- Color filter evaluation

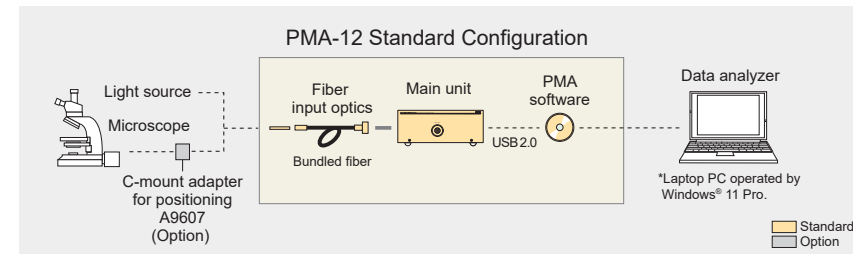
# What is PMA-12?

## Features

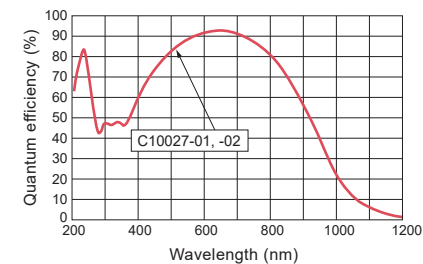
- Spectrometer, photo-detector and power supply in a compact unit
- Real-time measurements (Simultaneous measurement of multiple wavelengths possible)
- Easy measurements with optical fiber
- Spectral response and wavelength calibrated
- Support many applications with the option



## System Configuration



## Spectral response (Typ.) BT-CCD linear image sensor



# Application Examples

## Light source measurements

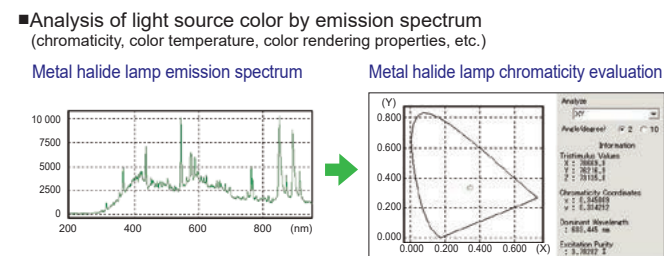
Measurement of emission spectra in light sources such as lamps and LEDs

**Configuration**

- Standard PMA-12 configuration (C10027-01, -02)

**Applications**

- Evaluation of color temperature and color rendering properties in light sources for illumination
- LED chromaticity evaluations
- Special applications of light source spectral evaluations



## Emission spectrum measurements

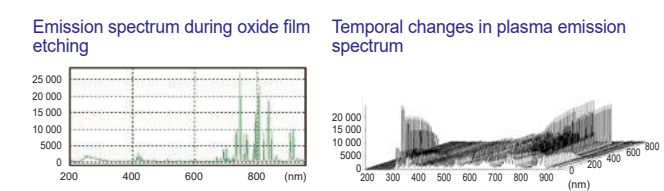
Emission spectrum measurements for plasma, electric discharge, ablation and the like

**Configuration**

- Standard PMA-12 configuration (C10027-01, -02)
- < Options >
- C-mount adapter for positioning A9607

**Applications**

- Plasma component analysis
- Analysis of various emission phenomena



## Emission spectrum measurements

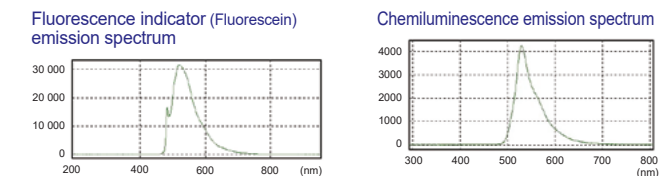
For fluorescent samples such as fluorescent lamps and EL devices

**Configuration**

- Standard PMA-12 configuration (C10027-01, -02)
- < Options >
- Excitation light source: laser, xenon lamp, etc.
- Sample Holder for transmission and fluorescence measurement A6751

**Applications**

- Fluorescence spectroscopy
- Monitoring chemical light emissions



## Microscopic spectral measurements

Spectral distribution measurements under a microscope

**Configuration**

- Standard PMA-12 configuration (C10027-01, -02)
- < Option >
- C-mount adapter for positioning A9607

**Applications**

- Measurement of bioluminescence
- Measurements on semiconductor wafer, LCD and other microstructures

# Software

## Measurement modes

### Standard measurements

This is the most basic measurement mode.  
Applications: e.g. emission spectra for light sources, fluorescence, plasma and etc.

### Reflective measurements

This is the measurement mode for finding spectral reflectance.  
Applications: e.g. reflectance measurements for optical filters, coatings and etc.

### Transmittance and absorption measurements

This is the measurement mode for finding spectral transmittance and absorption.  
Applications: e.g. measurements of transmittance and absorption in optical filters, films, solutions and etc.

### Chromaticity measurements (light-source color)

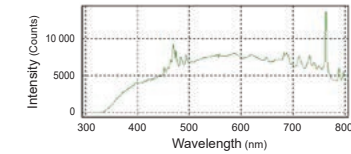
This is the measurement mode for finding the light-source color for luminous bodies.  
Applications: e.g. color evaluation in light sources for illumination, LEDs and etc.

### Chromaticity measurements (object color)

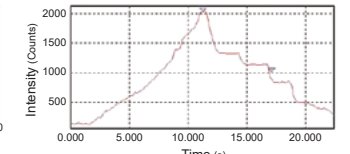
This is the mode for finding the color of objects that are either reflective or transmit light.  
Applications: e.g. color evaluation of paint, fabric, printed matter and etc.

## Display modes

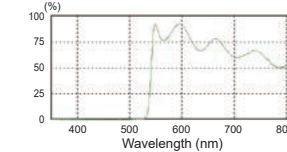
### Spectrum display



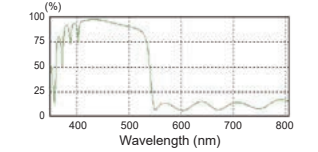
### Display of changes over time



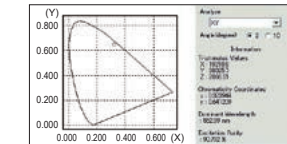
### Transmittance display



### Reflectivity display



### Color coordinate display



## Absorption spectrum measurements

Spectral transmittance and absorption measurements in optical filters, films, solutions and the like

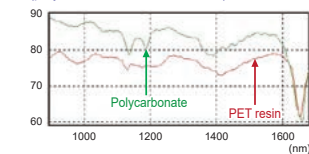
**Configuration**

- Standard PMA-12 configuration (C10027-01, -02)
- < Options >
- Xe light source high stability 150 W L6759
- Sample Holder for transmission and fluorescence measurement A6751

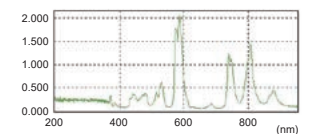
**Applications**

- Absorption spectrum evaluations for solutions and films
- Component analysis for samples
- Monitoring chemical changes

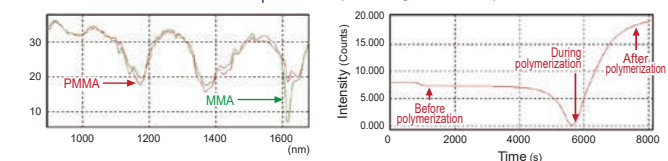
### Component analysis of plastics using transmission spectra (polycarbonate and PET resins)



### Didymium film absorption spectrum



### Changes of transmission in the polymerization from MMA to PMMA (wavelength: 1615 nm)



## Reflective spectrum measurements

Measurement of spectral reflectance in optical filters, anti-reflective films (AR coatings) and the like

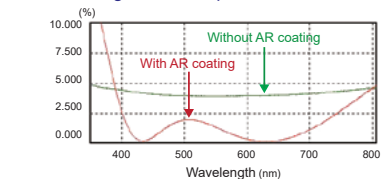
**Configuration**

- Standard PMA-12 configuration (C10027-01, -02)
- < Options >
- Xe light source high stability 150 W L6759
- Optical split fiber UV to VIS 2 m A10193-01

**Applications**

- Inspection of coatings
- Monitoring thin film growth

### AR coating reflection spectrum



## Object color measurements

Object color measurement of paint, fabric, printed matter and the like

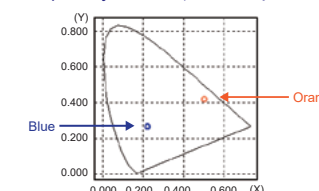
**Configuration**

- Standard PMA-12 configuration (C10027-01, -02)
- < Option >
- Halogen lamp L6758-11E

**Applications**

- Paint inspections
- Color evaluations in printed matter, fabric, plastics, etc.

### Paper object color (chromaticity coordinates)



## ■ Specifications

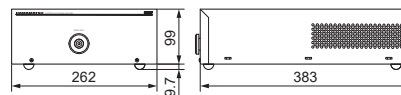
Product number	C10027-01	C10027-02
Photo-detector	BT-CCD linear image sensor	
Wavelength (nm)	200 to 950	350 to 1100
Wavelength resolution (FWHM)*1	< 2 nm	< 2.5 nm
Wavelength accuracy	< ±0.75 nm	
Exposure time (Internal trigger Mode)	19 ms to 64 s	
Number of photosensitive device channels	1024 ch	
Pixel size	24 μm × 2928 μm	
Device cooling temperature	-15 °C	
Read-out noise (electrons) (Max.)	16	
Dark current (electrons/scan) (Max.)	32 (-15 °C, 20 ms)	
AD resolution	16 bit	
Spectrograph	Czerny-Turner type	
Spectrograph F number	4	
Fiber type	Bundled fiber Φ12 mm SUS tube	
Fiber length	1.5 m	
Fiber receiving area	Φ1 mm	
External trigger input	TTL level / High impedance	
Interface	USB 2.0 *2	
Power supply	AC 100 V to AC 240 V, 50 Hz/60 Hz (Power supply voltage variation ±10 %)	
Power consumption	Approx. 70 VA	
Ambient operating temperature	+10 °C to +30 °C	

\*1 Confirmed with mercury and argon atomic beams.

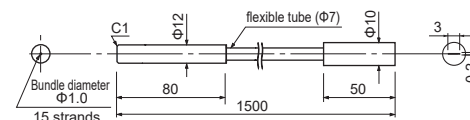
\*2 1.5 m cable is included as standard.

## ■ Dimensional outlines (Unit : mm)

- Main unit C10027-01, -02 (Approx. 5.7 kg)



- Fiber input optics (Approx. 100 g)



## ■ Basic software for PMA-12 U6039-01

- Measurement functions ..... Monitoring measurement  
Data measurement
- Temporal resolution measurement functions ..... Temporal fluctuation of spectra  
Temporal fluctuation in reflectivity and transmissivity
- Data acquisition condition settings ..... Exposure time settings  
Memory integration count assignment
- Calibration/correction ..... Wavelength axis calibration  
Sensitivity inconsistency calibration  
Dark current correction
- Display functions ..... Spectrum display  
Display temporal waveform fluctuations
- Wavelength axis display ..... Wavelength, Wavenumber, Raman shift, energy (eV)
- Brightness axis display ..... Linear, Logarithmic
- Cursor functions ..... Wavelength (wavenumber, etc.) vs. intensity  
Peak detection  
FWHM measurement  
Integrated intensity
- Other functions ..... Smoothing  
Differential waveform  
Color calculation (XYZ, xy, uv, Lab)

## ■ Options



Sample Holder for transmission and fluorescence measurement A6751

This is a dedicated holder with an integrated condensing lens for the use with vials.



Reflection measurement optics A9665

These are optics making it possible to illuminate the sample at 45° to the light source and measure the reflected light.



Optical split fiber 2 m A10193-01, -02

It is very useful for reflectance measurement or film thickness measurement. We have two kinds of fiber. One is A10193-01 for from UV to visible light and the other is A10193-02 for from visible to NIR light range.



C-mount fiber adapter A6399

This is an adapter for securing the fiber input optics to the C-mount of a microscope or the like. The A6399 is usable in the UV to NIR.



C-mount adapter for positioning A9607

In addition to the function of the C-mount fiber adapter, the measurement position can be checked. The A9607 is usable in the UV to NIR.



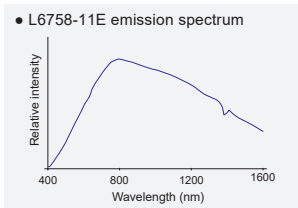
Attenuation fiber adapter A10474-01

This adaptor is used when the light power is too strong. It can reduce the input light power by using a pinhole. (fading rate approx. 1/20 to 1/500)



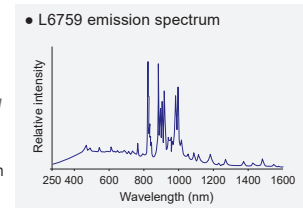
Halogen lamp L6758-11E

This is a halogen light source with output wavelengths from 400 nm to 1600 nm for excitation and absorption measurements.



Xe light source High stability 150 W L6759

This is a high stability xenon light source with output wavelengths from 250 nm to 1600 nm for excitation and absorption measurements.



Software library U10472-01

This is the software library which controls the PMA-12.

Color measurement library U10473-01

This is the software library which controls the PMA-12 and calculates the chromaticity.

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- The products described in this brochure are designed to meet the written specifications, when used strictly in accordance with all instructions.
- The spectral response specified in this brochure is typical value and not guaranteed.
- The measurement examples in this brochure are not guaranteed.
- Specifications and external appearance are subject to change without notice.

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