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Mini-spectrometers

TG series | C11713CA

For Raman spectrophotometry, high resolution type (spectral resolution: 0.3 nm)

The C11713CA is polychromators integrated with optical elements, an image sensor and a driver circuit. Light to be measured is guided into the entrance port of TG series through an optical fiber and the spectrum measured with the built-in image sensor is output from the USB port to a PC for data acquisition. The C11713CA has sensitivity in a wavelength range of 500 to 600 nm. The C11713CA offers a spectral resolution of 0.3 nm. This product comes supplied with free evaluation software that allows setting measurement conditions, acquiring and saving data, and displaying graphs. Original measurement software can be designed on an end-user's side as DLL's function specification is disclosed.

Features

- **High accuracy optical characteristics: spectral resolution 0.3 nm**
- **Easy to install into equipment due to compact design**
- **High throughput due to transmission grating made of quartz**
- **Wavelength conversion factor is recorded in internal memory *1**

Applications

- **Raman spectrophotometry**

*1: A conversion factor for converting the image sensor pixel number into a wavelength is recorded in the module. A calculation factor for converting the A/D converted count into the input light intensity is not provided.

Selection guide (Typ.)

Parameter	C11713CA	Unit
Spectral response range	500 to 600	nm
Spectral resolutiion	0.3	nm
Built-in image sensor	Back-thinned CCD image sensor	-

Structure

Parameter	Specification	Unit
Dimensions (W × D × H)	120 × 70 × 60	mm
Weight	592	g
Image sensor	Back-thinned type CCD image sensor (S10420-1106-01)	-
Number of pixels	2048	pixels
Slit*2 (H × V)	10 × 1000	µm
NA*3	0.11	-
Connector for optical fiber	SMA905D	-
A/D conversion	16	bit
Interface	USB 1.1	
External power supply (AC adapter)	AC 100V-240V, 50/60Hz	°C

*2: Entrance slit aperture size
*3: Numeric aperture (solid angle)

Absolute maximum ratings

Parameter	Value	Unit
External power supply voltage	5.25	V
Operating temperature*4	+5 to +40	°C
Storage temperature*4	-20 to +70	°C

*4: 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.
Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

Electrical characteristics (Ta=25 °C, unless otherwise noted)

Parameter	Min.	Typ.	Max.	Unit
Integration time		10 to 10000		ms
Consumption current of USB bus power*5	-	-	150	mA
External power supply voltage	-	5	-	V
Consumption current of external power supply*5	-	-	0.8	A

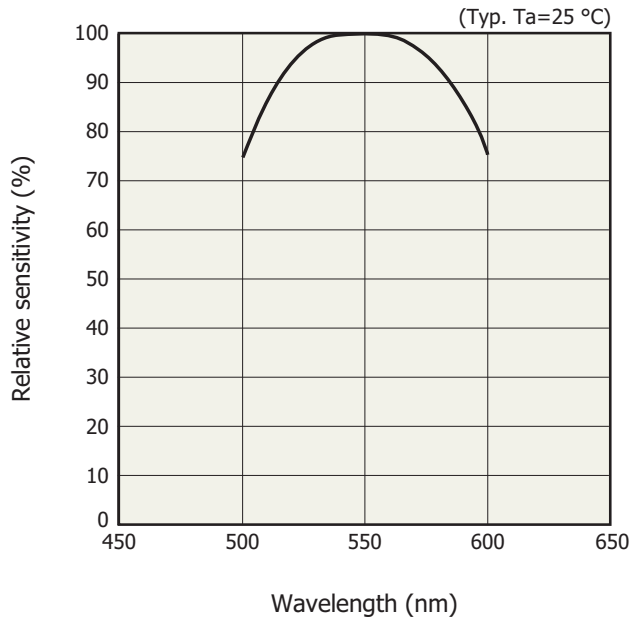
*5: When operated with the supplied evaluation software (at default settings, dark state, excluding start-up).

Electrical and optical characteristics (Ta=25 °C, unless otherwise noted)

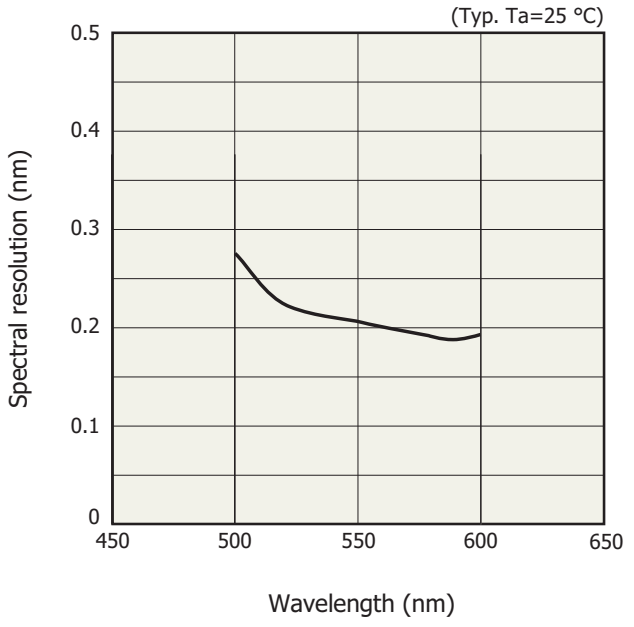
Parameter	Min.	Typ.	Max.	Unit
Spectral response range		500 to 600		nm
Spectral resolution (FWHM)*6	-	0.3	0.5	nm
Wavelength reproducibility*7		-0.1 to +0.1		nm
Wavelength temperature dependence		-0.04 to +0.04		nm/°C
Spectral stray light*6 *8	-	-	-30	dB

*6: Depends on the slit opening. Values were measured with the slit listed in the table "Structure".
*7: Measured under constant light input conditions
*8: When monochromatic light of the following wavelengths is input, spectral stray light is defined as the ratio of the count measured at the input wavelength, to the count measured in a region of the input wavelength ±10 nm
C11713CA: 550 nm

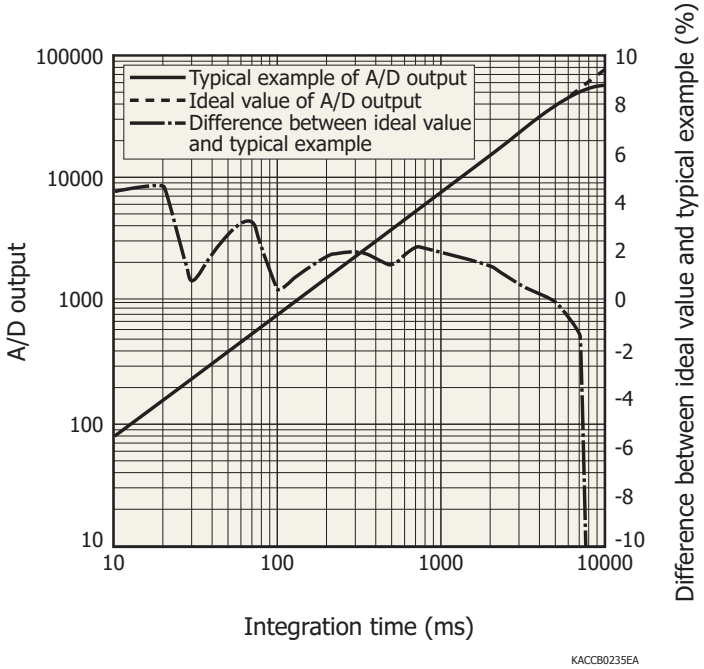
Spectral response (typical example)



Spectral resolution vs. wavelength

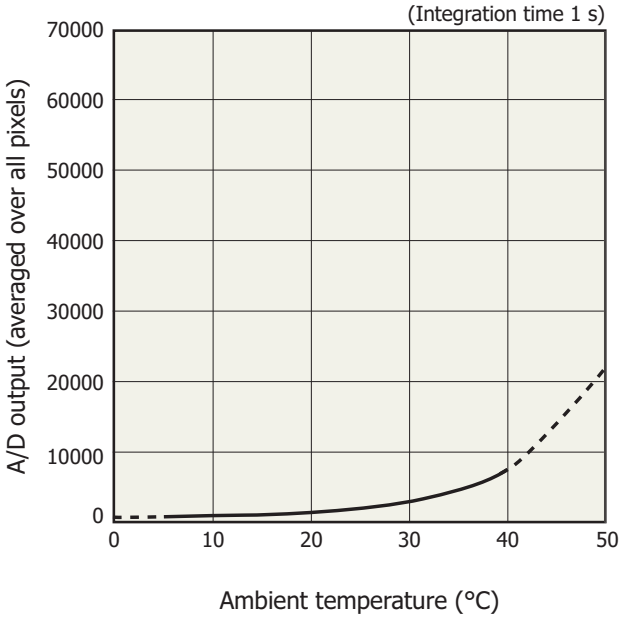


Linearity (typical example)



A/D output is the output with dark output is subtracted when light is input. The difference between the ideal value and typical example contains a measurement error. The smaller the A/D output, the larger the measurement error.

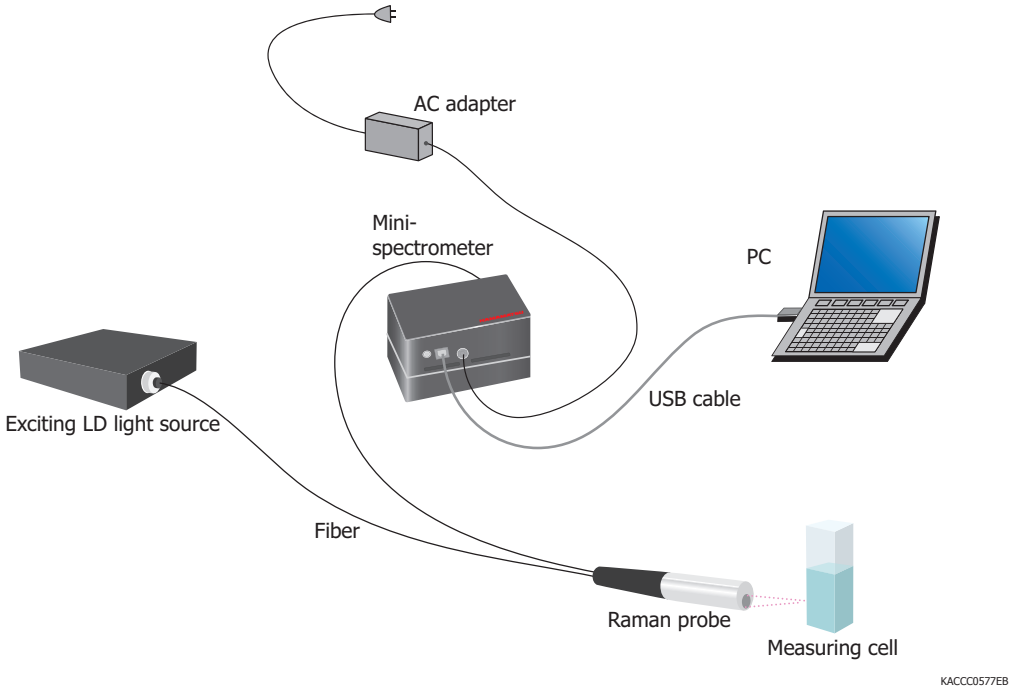
Dark output vs. ambient temperature (typical example)



A/D output is the sum of the sensor and circuit offset outputs and the sensor dark output.

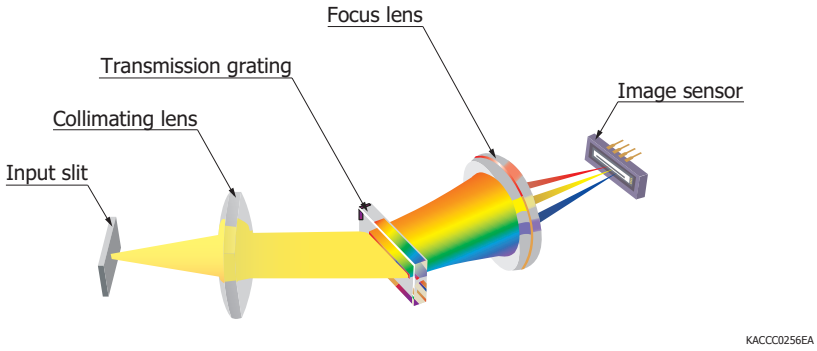
Connection example

Light to be measured is guided into the entrance port of TG series through an optical fiber and the spectrum measured with the built-in image sensor is output through the USB port to a PC 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.



Optical component layout

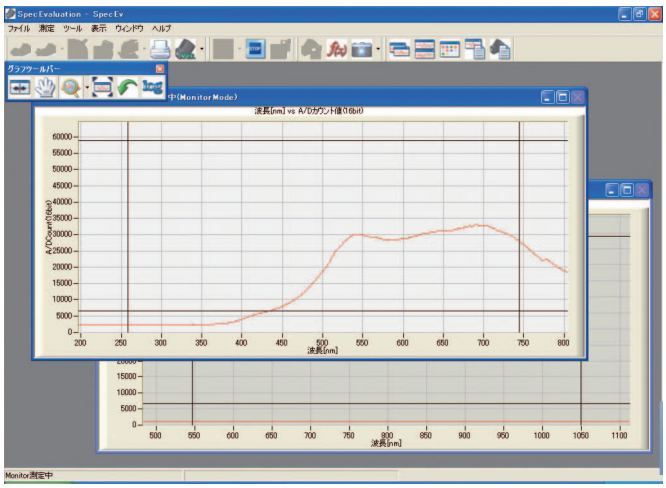
TG series mini-spectrometers use a transmission holographic grating made of quartz and precision optical components arranged on a rugged optical base, making it possible to deliver high throughput and highly accurate optical characteristics.



Evaluation software package (supplied with unit)

Installing the evaluation software package (Spec Evaluation.exe)*8 into your PC allows running the following basic tasks:

- Measurement data acquisition and save
- Measurement condition setup
- Module information acquisition
  (wavelength conversion factor, polychromator type, etc.)
- Graphic display
- Arithmetic operation
  Pixel number to wavelength conversion
  Comparison calculation with reference data
  (transmittance, reflectance)
  Dark subtraction
  Gaussian approximation
  (peak position and count, FWHM)



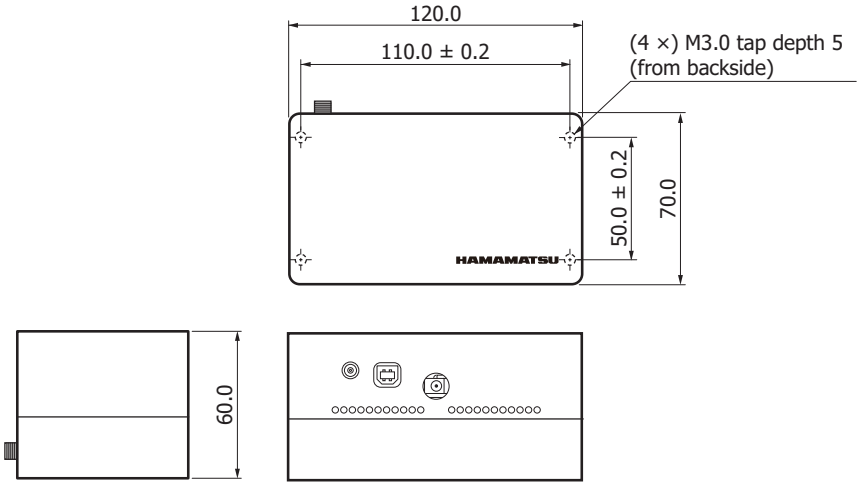
Note:

- Two or more mini-spectrometers can be connected and used with one PC simultaneously.
- The external trigger input function does not work with the evaluation software. If using an external trigger input or designing original application software, the user software must be configured to support that function.

*8: Compatible OS: Microsoft® Windows® 7 Professional SP1 (32-bit, 64-bit)
Microsoft Windows 8 Professional (32-bit, 64-bit)
Microsoft Windows 10 Professional (32-bit, 64-bit)

DLL for controlling hardware is also provided.
You can develop your own measurement programs by using a following software development environment.
Microsoft Visual Studio® 2008 (SP1) Visual C++®
Microsoft Visual Studio 2008 (SP1) Visual Basic®
Note: Microsoft, Windows, Visual Studio, Visual C++ and Visual Basic are either registerd trademarks or trademarks of Microsoft Corporation in the United States and other countries.

Dimensional outline (unit: mm, tolerance unless otherwise noted: ±0.5)



Weight: 592 g

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Accessories

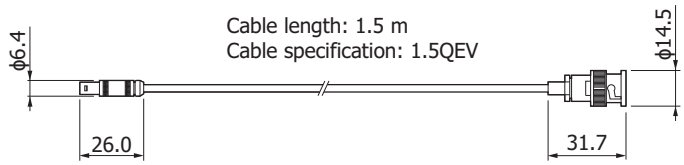
· USB cable
· Dedicated software (evaluation software, sample software, DLL)
· AC adapter (for power supply)

Options (sold separately)

· Coaxial cable for external trigger input A10670
· Optical fibers for light input

Type no.	Product name	Core diameter (µm)	Specification
A15363-01	Fiber for visible/near infrared range	600	NA=0.22, length 1.5 m, connectorized SMA905D at both ends

■ Dimensional outline (A10670, unit: mm)



LEMO connector
FFA.00.250 (made by LEMO)

BNC connector
BNC-P-1.5 (40) (made by HIROSE or equivalent)

KACCA0220EB

Related information

www.hamamatsu.com/sp/ssd/doc_en.html

■ Precautions
· Disclamer
· Mini-spectrometers

■ Technical information
· Mini-spectrometers

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