



C13560

## SERS detection module

The C13560 spectroscopic module is a ultra-compact Raman spectroscopic module that incorporates a mini-spectrometer, compact optical system, and other Hamamatsu original technologies. The dedicated SERS substrate J13856-01 is used to perform Raman spectroscopy. It is also possible to perform Raman spectroscopy without using the J13856-01. It can be used for simple onsite point-of-care testing (POCT) and other screening tests.

### Features

- Built-in laser, spectrometer, and driver circuit
- Ultra-compact and lightweight
- Low power consumption
- High-sensitivity measurements using a SERS substrate

### Applications

- Environment (water quality inspection, agricultural chemical, and toxic substance inspection, etc.)
- Safety control (foreign matter checking in foods and medicine and the like)

### Structure

Parameter	Specification	Unit
Dimensions (W × D × H)*1	80 × 60 × 12.5	mm
Weight*1	90	g
Interface	USB 2.0	-

\*1: Excluding the SERS substrate holder

### Absolute maximum ratings

Parameter	Condition	Symbol	Value	Unit
Operating temperature	No dew condensation*2	Topr	+15 to +35	°C
Storage temperature	No dew condensation*2	Tstg	-10 to +50	°C
Power supply voltage		Vs	5.25	V

\*2: When there is a temperature difference between a product and the surrounding area in high humidity environments, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability.

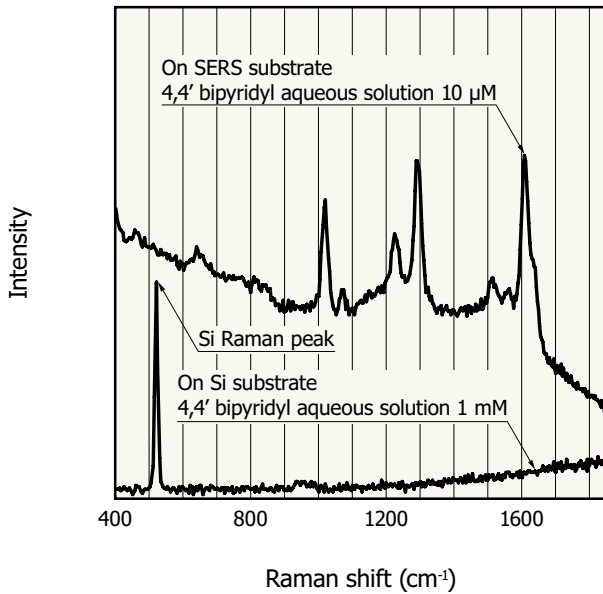
Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

### Electrical and optical characteristics (Ta=25 °C)

Parameter		Condition	Min.	Typ.	Max.	Unit
Laser	Excitation wavelength	A specific 5 °C range within the operating temperature range	-	785	-	nm
	Output*3		-	5, 10, 15	-	mW
	Line width		-	0.2	-	nm
Detection area	Detector		High-sensitivity CMOS image sensor			-
	Spectral range		-	400 to 1850	-	cm <sup>-1</sup>
	Resolution		-	10	-	cm <sup>-1</sup>
USB bus power consumption			-	-	0.9	W

\*3: Can be changed with the sample software

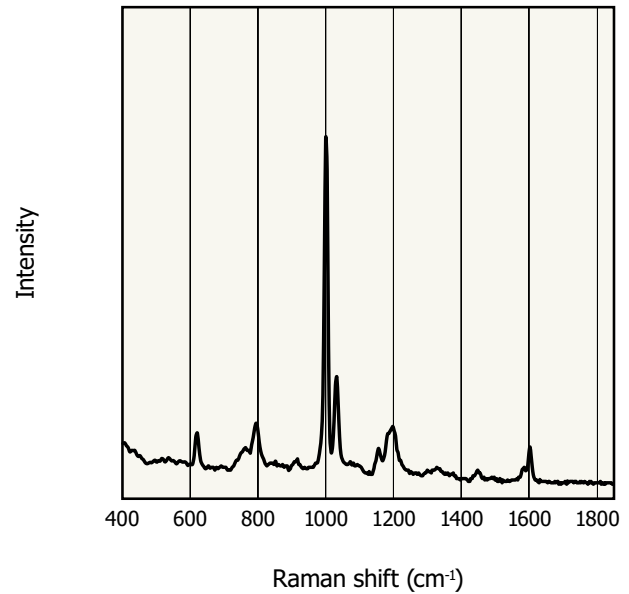
### Example of Raman measurements using SERS or Si substrate



Integration time: 1 s, average count: 10  
 · When using SERS substrate: Laser intensity: 5 mW  
 · When using Si substrate: Laser intensity: 15 mW

KACCB0496EA

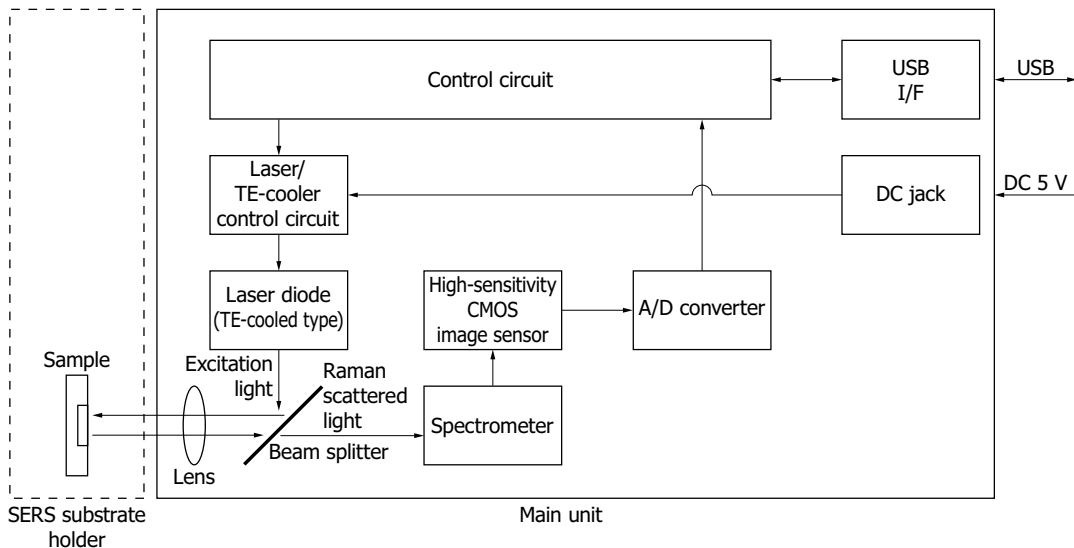
### Example of Raman measurements of polystyrene board (SERS substrate not used)



Integration time: 1 s, average count: once  
 Laser intensity: 15 mW

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### Block diagram



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### Connection example



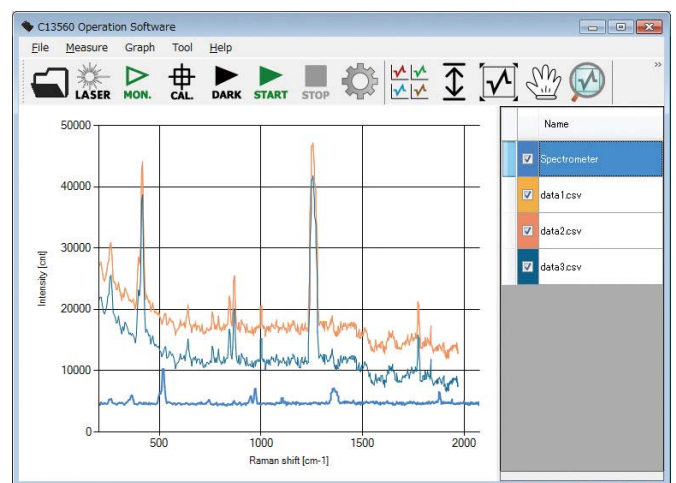
### Sample software (accessory)

By installing the sample software (C13560\_OperationSoftware)\*4 into a PC, you can perform the following basic operations.

- Acquire and save measured data
- Set measurement conditions
- Display graphs
- Arithmetic functions
  - Wave number calibration
  - Dark subtraction
  - Peak search
  - Gaussian fitting
  - Lorentz fitting
  - Baseline collection

\*4: Compatible OS

- Microsoft Windows 8.1 (32-bit, 64-bit)
- Microsoft Windows 10 (32-bit, 64-bit)



A DLL for controlling the hardware is available.

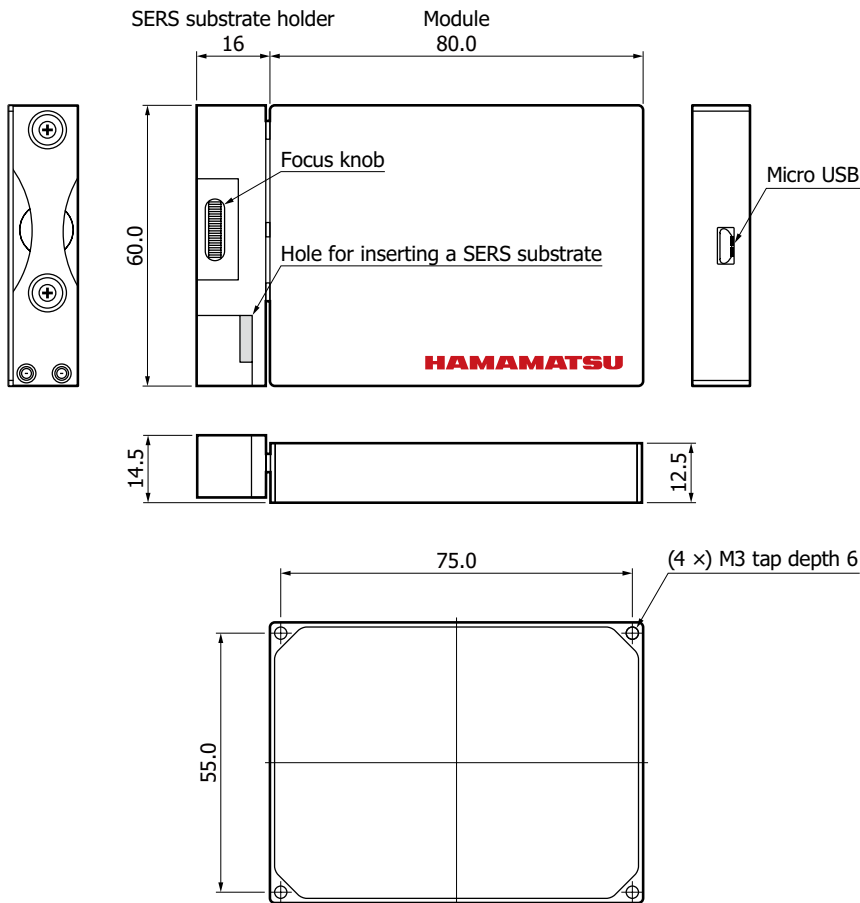
Users can develop original measurement programs using the following development platform.

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 registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

### Dimensional outline (unit: mm)



Tolerance unless otherwise noted:  $\pm 0.5$

Note: With the SERS substrate holder and module close together

KACCA0413EB

### Accessories

- CD-ROM (sample software\*<sup>5</sup>)
- USB cable
- Si substrate for calibration

\*5: Software development materials can be provided.

#### ☑ Safety measures of laser products

This product is a class 3B laser product designed to be embedded in a device. As such, shutters, interlocks, and other requirements defined in JIS C 6802: 2014 are not met. Be very careful in handling this product.

During use, be sure to provide the safety measures described in JIS C 6802: 2014 (Radiation Safety Standards for Laser Products).

INVISIBLE LASER RADIATION  
AVOID EYE OR SKIN EXPOSURE  
TO DIRECT RADIATION  
MAXIMUM OUTPUT POWER 80mW  
WAVELENGTH 785nm  
CLASS 3B LASER PRODUCT  
IEC60825-1 : 2007 / 2014

## SERS substrate J13856-01 (sold separately)

A surface-enhanced Raman spectroscopy (SERS) substrate enhances the Raman scattered light from the molecules, making high-sensitivity Raman spectroscopic analysis possible. A fine metal structure (chip) is mounted on Hamamatsu original handling plate to protect the active area. The active area of the handling plate has a well structure for easy attaching solution or the like. Note that this is a disposable product and cannot be reused.



■ Notice

- Do not apply shock or pressure anywhere on the substrate.
- This is a disposable product and cannot be reused.
- Recommended storage temperature: 4 to 25 °C (unopened condition)
- The expiration date is indicated on the packing. Do not use the product after the expiration date.

Note: The expiration date is 3 months after the shipping date on the packing.

Parameter	Specification	Unit
Substrate size	10 × 25 × 2.5	mm
Chip size	4 × 4	mm
Active area	φ3.0	mm
Activated surface structure	Metal nanostructure	-
Handling plate material	Polypropylene	-
Raman excitation wavelength (recommended)	785	nm

The J13856-01 is a product for customers that have purchased the C13560.

## ■ Related information

[www.hamamatsu.com/sp/ssd/doc\\_en.html](http://www.hamamatsu.com/sp/ssd/doc_en.html)

■ Precautions

- Disclaimer

The content of this document is current as of March 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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