

FTIR engine (FT-NIR spectrometer)



C15511-01

Compact spectrometer that can be incorporated into portable analytical instruments

The C15511-01 Fourier transform infrared spectrometer (FTIR) engine is compact enough to carry in just one hand. A Michelson optical interferometer and control circuit are built into a palm-sized enclosure. Spectrum and absorbance can be measured by connecting a PC via USB. It can be applied to real-time measurement performed on site without bringing the measurement sample into the analysis room as well as continuous monitoring.

The optical interferometer has a built-in light input section, beam splitter, fixed mirror, movable mirror ($\phi 3$ mm), and photodetector. The photodetector acquires light intensity signals that vary depending on the position of the movable mirror. The optical spectrum is obtained by processing (Fourier transform) these light intensity signals.

The FTIR engine has a built-in semiconductor laser (VCSEL: vertical cavity surface emitting laser) for monitoring the movable mirror position, which allows spectrum measurement with high wavelength accuracy.

The product includes evaluation software with functions for setting measurement conditions, acquiring and saving data, drawing graphs, and so on. Furthermore, the dynamic link library (DLL) function specifications are disclosed, so users can create their original measurement software programs.

Features

- **Compact: palm size**
- **Optical fiber input type**
- **High wavelength accuracy**
- **High S/N**
Suitable for diffuse reflection measurements and absorbance measurements
- **Spectral response range: 1100 nm to 2500 nm**

Applications

- **Process analysis**
- **Material inspection**
- **Farm product inspection**
- **Plastic sorting**
- **Concrete strength measurement**
- **Film thickness measurement**
- **Medical and healthcare equipment**

Structure

| Parameter | Specification | Unit |
|------------------------|---|------|
| Optical interferometer | Michelson interferometer (with a built-in $\phi 3$ mm movable mirror) | - |
| Photodetector | InGaAs PIN photodiode | - |
| Light input method | Optical fiber input type*1 (with SMA connector) | - |
| Interface | USB 2.0 | - |
| Dimensional outline*2 | 49 × 57 × 76 (excluding protrusions) | mm |
| Weight | Approx. 300 | g |

*1: Optical fiber A17630-015 (core diameter: 600 μ m, NA: 0.22)

*2: Excluding protrusions of optical input parts and the like

➤ Absolute maximum ratings

| Parameter | Symbol | Condition | Value | Unit |
|-----------------------|------------------|-----------------------|------------|------|
| Operating temperature | T _{opr} | No dew condensation*3 | +5 to +50 | °C |
| Storage temperature | T _{stg} | No dew condensation*3 | -20 to +70 | °C |

*3: When there is a temperature difference between a product and the surrounding area in high humidity environment, dew condensation may occur on the product. 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.

➤ Optical characteristics [Ta=25 °C, light input through optical fiber (core diameter 600 μm, NA 0.22)]

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|-----------------------------------|---------------|-------------------|-------|--------------|-------|-------|
| Spectral response range | λ | | - | 1100 to 2500 | - | nm |
| Spectral resolution (FWHM)*4 | - | $\lambda=1533$ nm | - | 5.7 | 8 | nm |
| Wavelength reproducibility*5 | λ_r | $\lambda=1533$ nm | - | - | 0.5 | nm |
| Wavelength temperature dependence | λT_d | | -0.06 | - | +0.06 | nm/°C |
| Signal-to-noise ratio*6 *7 | S/N | | 10000 | - | - | - |

*4: Wavenumber resolution (FWHM) equivalent to 25 cm⁻¹

*5: Variation (3σ) of spectral peak values when λ=1533 nm laser light is measured 50 times in succession

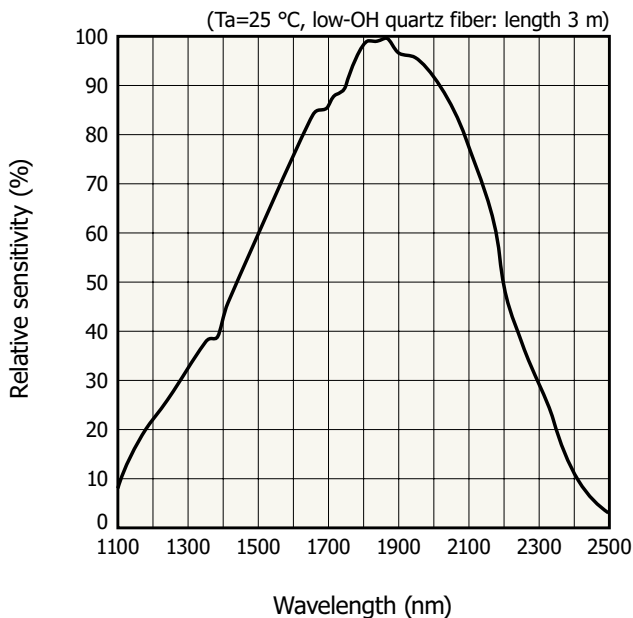
*6: Ratio of the peak value of the spectrum data when light is incident to the root mean square (rms) of noise in the dark state

*7: Incident light level 40000 counts p·p min., integration count 512, gain setting 1 to 4

➤ Electrical characteristics

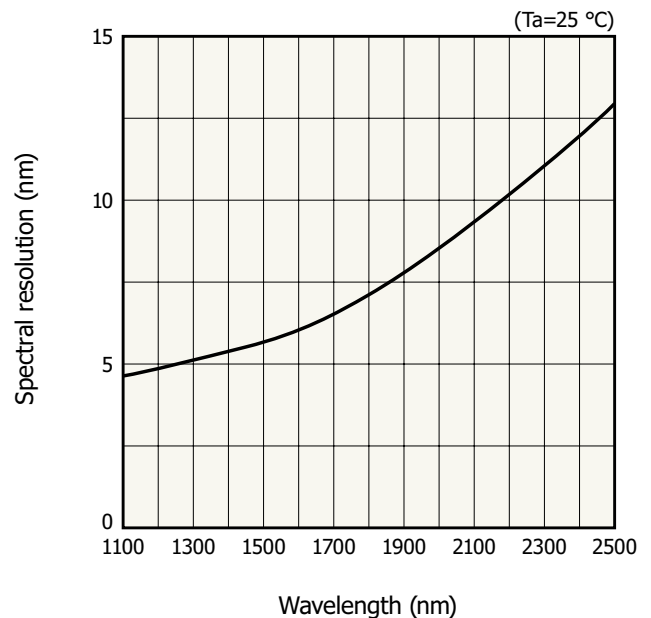
| Parameter | Min. | Typ. | Max. | Unit |
|-----------------------------------|------|------|------|------|
| A/D conversion | - | 16 | - | bit |
| Drive frequency | 225 | 275 | 325 | Hz |
| USB bus power current consumption | - | 450 | 500 | mA |

➤ Spectral response (typical example)



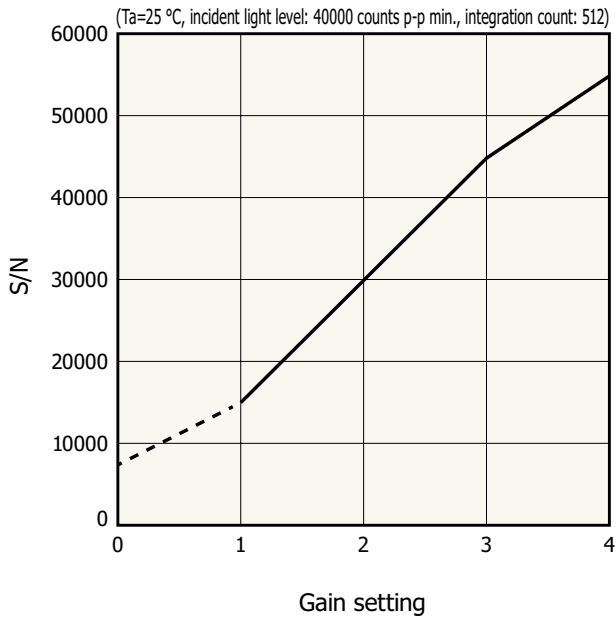
KACCB0619EA

➤ Spectral resolution vs. wavelength (typical example)



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S/N vs. gain setting (typical example)

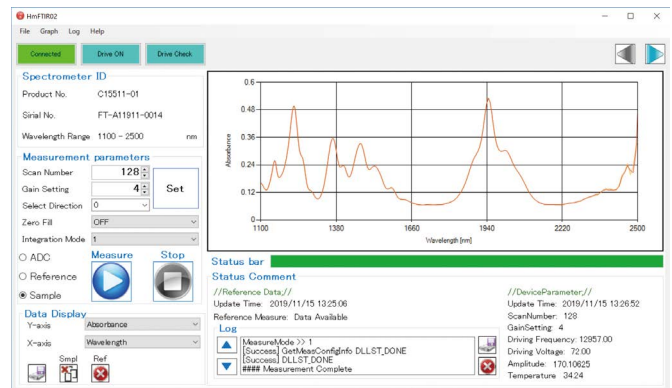


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Evaluation software (accessory)

By installing the evaluation software (HmFTIR02Main.exe) into a PC, you can perform the following basic operations.

- Acquire and save measured data
- Measurement condition setting
- Acquire spectrometer information (type no., serial number, spectral response range, etc.)
- Display graphs
- Arithmetic function
- Compare against reference data (absorbance and the like)

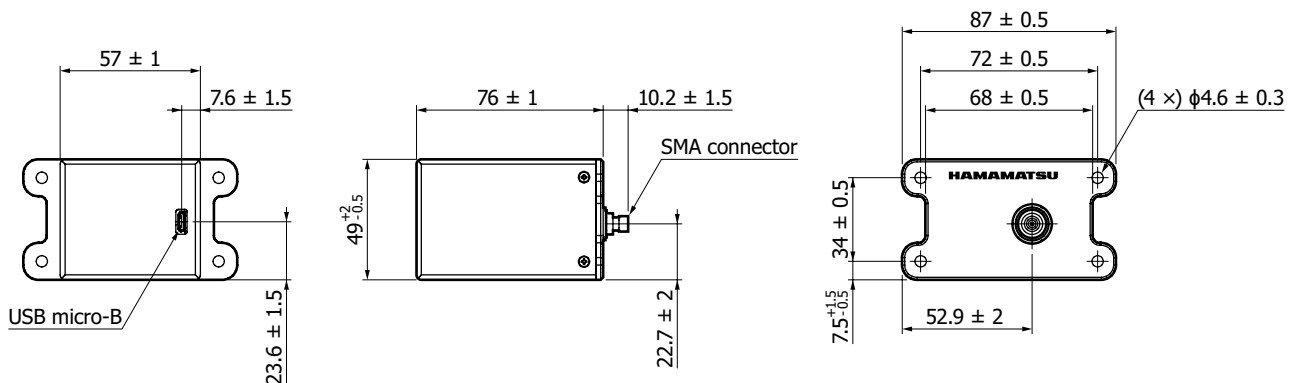


Note: Up to eight FTIR engines can be connected to a single PC and used.

Compatible OS: Microsoft® Windows® 10 (64-bit)
Windows® 11 (64-bit)

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Dimensional outline (unit: mm)



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Precautions

- Do not apply excessive vibration or shock to the product. Excessive vibration or shock can misalign the internal optical components of the product.
- This product is classified as Class 1 under the laser standard IEC60825-1: 2014. Do not disassemble the product to prevent laser light from entering your eyes.

Accessories

- CD-ROM (instruction manual, evaluation software, etc.)
- USB cable (USB 2.0 micro-B connector type)

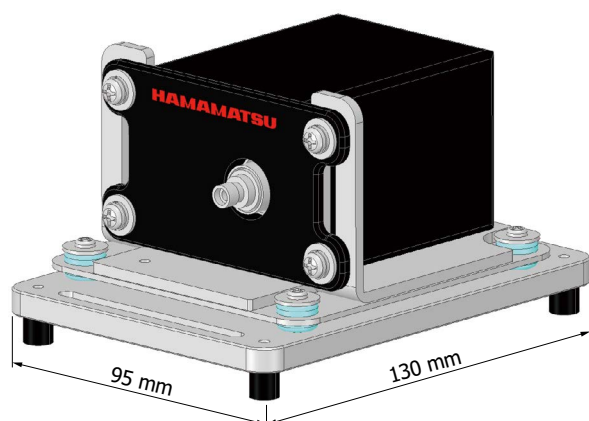
Options (sold separately)

- Optical fiber cable A17630-015

| Connector | Specification |
|-----------------|---|
| SMA on each end | 600 μm core, NA=0.22, Low-OH Optical fiber, Length: 1500 mm, Metal covering, With CPS (Cladding Power Stripper) |

- Vibration isolation table A15835-01

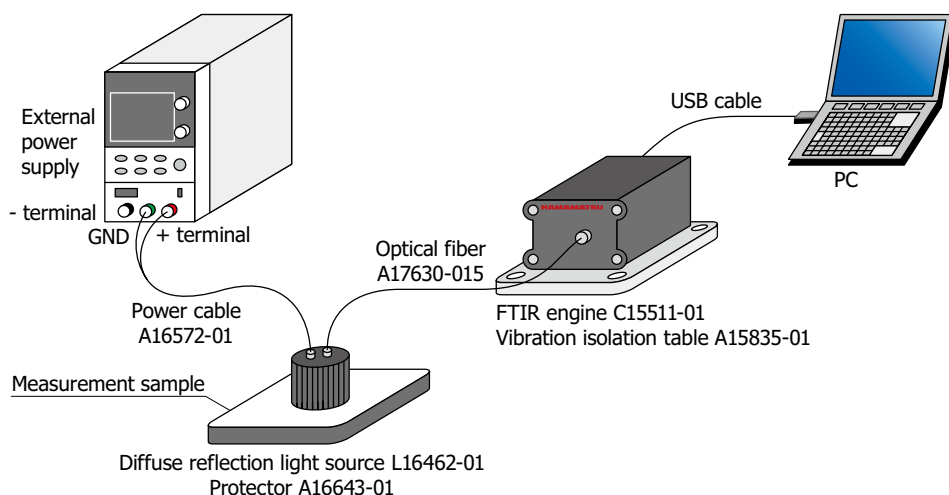
- Vibration isolation table equipped with FTIR engine



KACCC1025EA

Connection example

A connection example using Hamamatsu FTIR engine (C15511-01) is shown below.



KACCC1182EC

Related products

Diffuse reflection light source L16462-01



This is a module with built-in lamps and an optical fiber for doing diffuse reflection measurement in near-infrared spectrophotometry. With this product, in which plural lamps and an optical fiber are arranged close to each other, the weak diffused light emitted from the sample can be detected efficiently.

Features

- **Compact: $\phi 28.0$ mm \times 35.5 mm (excluding protrusions)**
- **Long life: 7000 hr (average)**
- **High detection efficiency (built-in multiple lamps)**
- **Wide wavelength range: 400 to 2500 nm**

Related information

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

- Precaution
 - Disclaimer
- Catalogs
 - Selection guide / Mini-spectrometers
 - Technical note / FTIR engine

Information described in this material is current as of March 2025.

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