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NEW

FTIR engine (FT-NIR spectrometer)

C16511-01

High-speed and compact near infrared spectrometer that can be incorporated into inline process

FTIR (Fourier Transform Infrared Spectrometer) engine C16511-01 is a compact Fourier transform near infrared spectrometer. A Michelson optical interferometer, a control circuit, and a calculation circuit are built into a compact enclosure. Spectrum and absorbance can be measured by connecting a PC via Ethernet. 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. In addition, Ethernet communication offers higher communication speed and durability than USB communication, making it applicable to FA devices. The optical interferometer has a built-in light input section, beam splitter, fixed mirror, movable mirror (ϕ3 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**
- **High speed: 275 frames/s**
- **Optical fiber input type**
- **High S/N**
  Suitable for diffuse reflection measurements and absorbance measurements
- **Spectral response range: 1100 nm to 2500 nm**
- **Ethernet compatible**

Applications

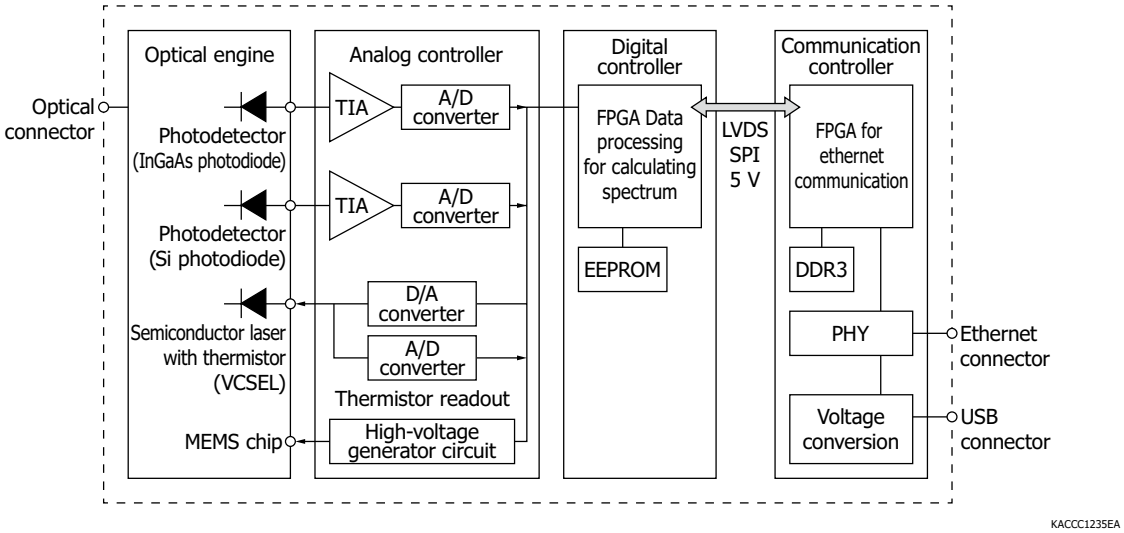
- **FA, PAT (Process Analytical Technology)**
- **Bioprocess analysis**
- **Material inspection**
- **Farm product and food inspection**
- **Plastic sorting**
- **Medicines inspection**

Structure

Parameter	Specification	Unit
Optical interferometer	Michelson interferometer (with a built-in ϕ3 mm movable mirror)	-
Photodetector	InGaAs PIN photodiode	-
Light input method	Optical fiber input type*1 (with SMA connector)	-
Interface	Ethernet compatible (GigE Vision)	-
Dimensional outline*2	68 × 124 × 66	mm
Weight	Approx. 580	g

*1: Optical fiber (core diameter: 600 µm, NA: 0.22)
*2: Excluding protrusions of optical input parts and the like

Block diagram



Absolute maximum ratings

Parameter	Symbol	Condition	Value	Unit
Operating temperature	Topr	No dew condensation*3	+5 to +50	°C
Storage temperature	Tstg	No dew condensation*3	-20 to +70	°C
Maximum input voltage	Vin max		27	V

*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	-	λ=1533 nm	-	5.7	8	nm
Wavelength reproducibility*5	λr	λ=1533 nm	-	-	0.5	nm
Wavelength temperature dependence	λTd		-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

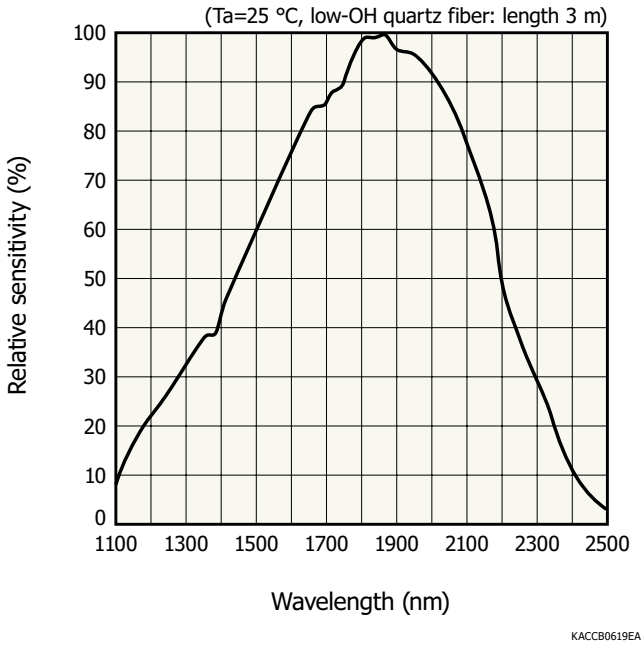
*7: Incident light level 40000 counts p-p min., integration count 512, gain setting 1 to 4

Electrical characteristics

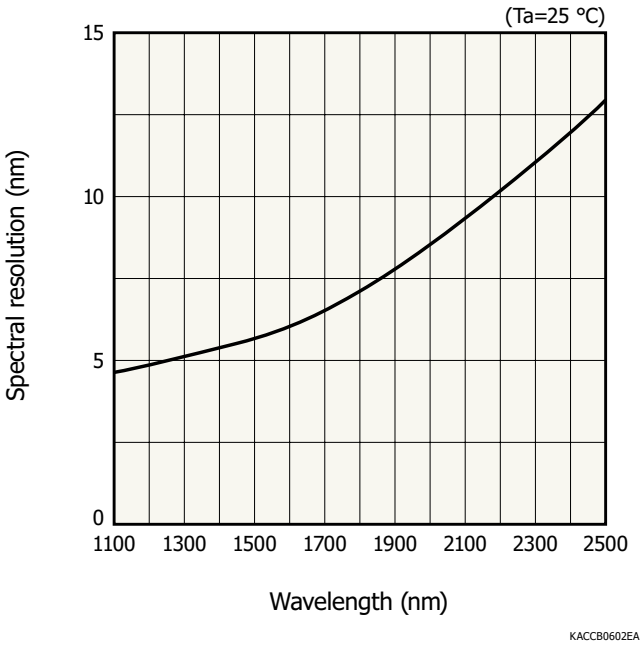
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage*8	Vin		-	12 or 24	-	V
Current consumption	Ain	Vin=24 V	-	0.3	1	A
Spectrum update rate	-		225	275	325	fps

*8: The recommended supply voltage is 24 V.

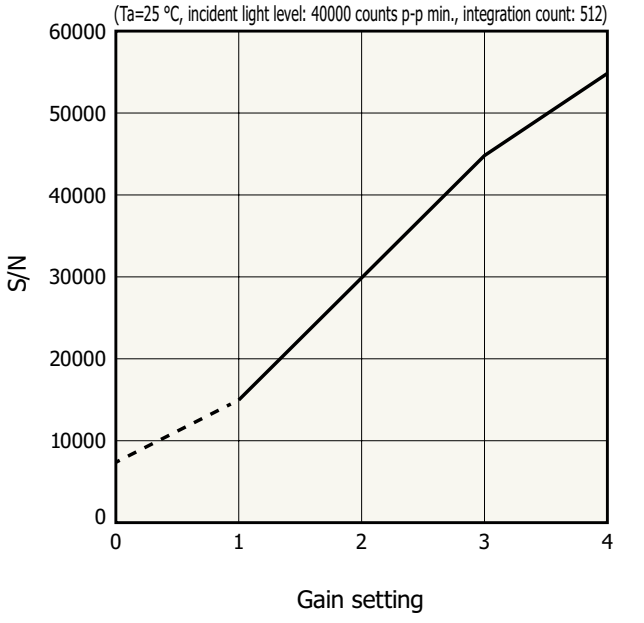
Spectral response (typical example)



Spectral resolution vs. wavelength (typical example)



S/N vs. gain setting (typical example)



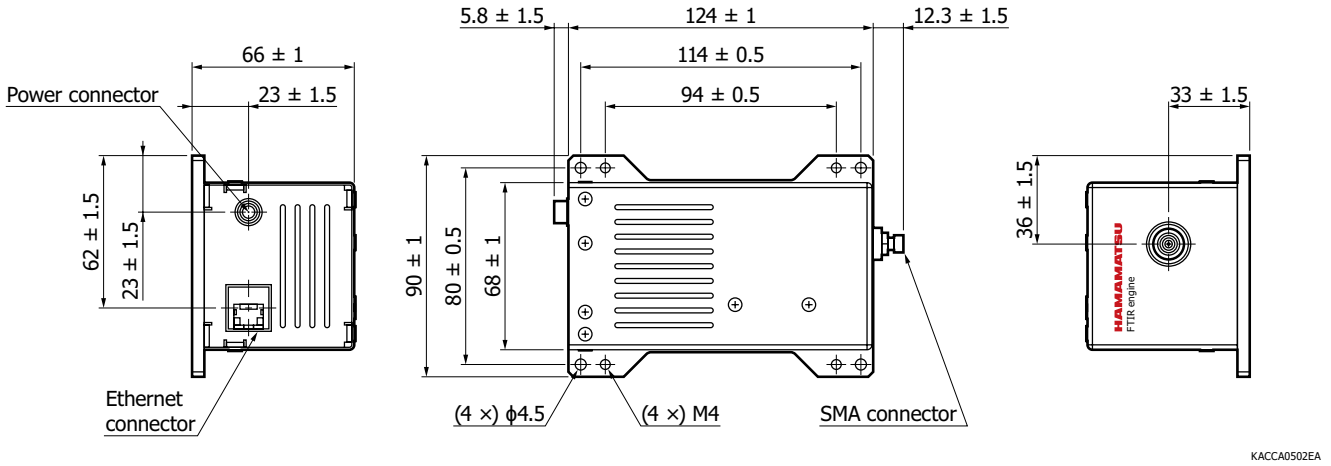
Evaluation software (accessory)

By installing the evaluation software 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: Compatible OS: Microsoft® Windows® 10 (64-bit)
      Compatible OS: Microsoft® Windows® 11 (64-bit)

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.
  EMC standard is as follow:
  IEC 61326-1, Emission limits: CISPR11 Group1 Class A, Immunity requirements: Table 2
· The recommended Ethernet cable is as follows:

Type	Maximum communication speed
Straight type	1 Gbps or higher (Category 6)

· Always use a power cable that is compatible with this product. Power cable A16568-01 is available (sold separately) to ensure proper power connection of the product.

Accessories

· CD-ROM (instruction manual, evaluation software, SDK)

Options (sold separately)

■ Power cable A16568-01

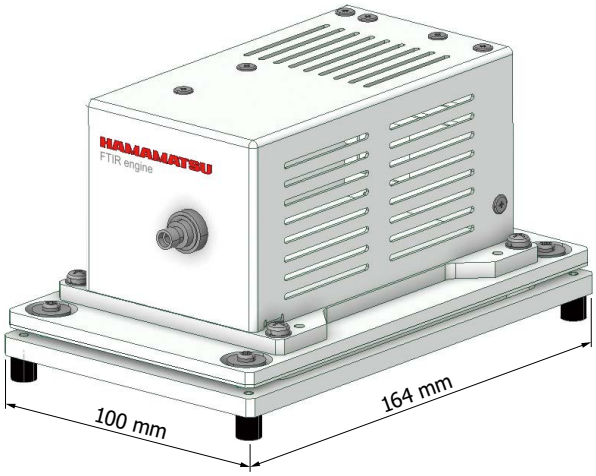
Connector	Specification
HR10-7P-4P (73)	Length: 2 m, One end: lead wire soldering , Wire: AWG26

■ 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 protect tube, With CPS (Cladding Power Stripper)

■ Vibration isolation table A17234-01

· Vibration isolation table with FTIR engine



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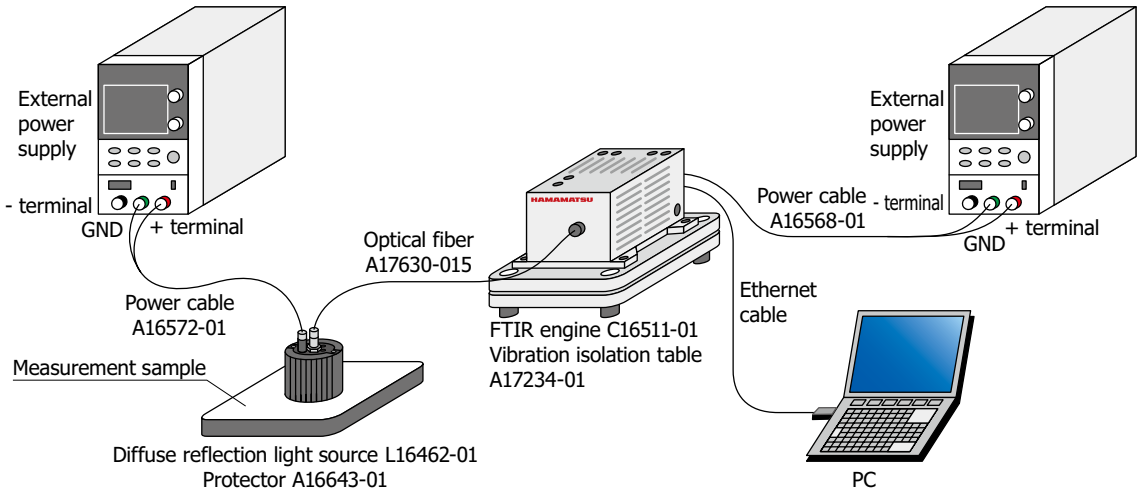
Connection diagram

Diffuse reflection measurement



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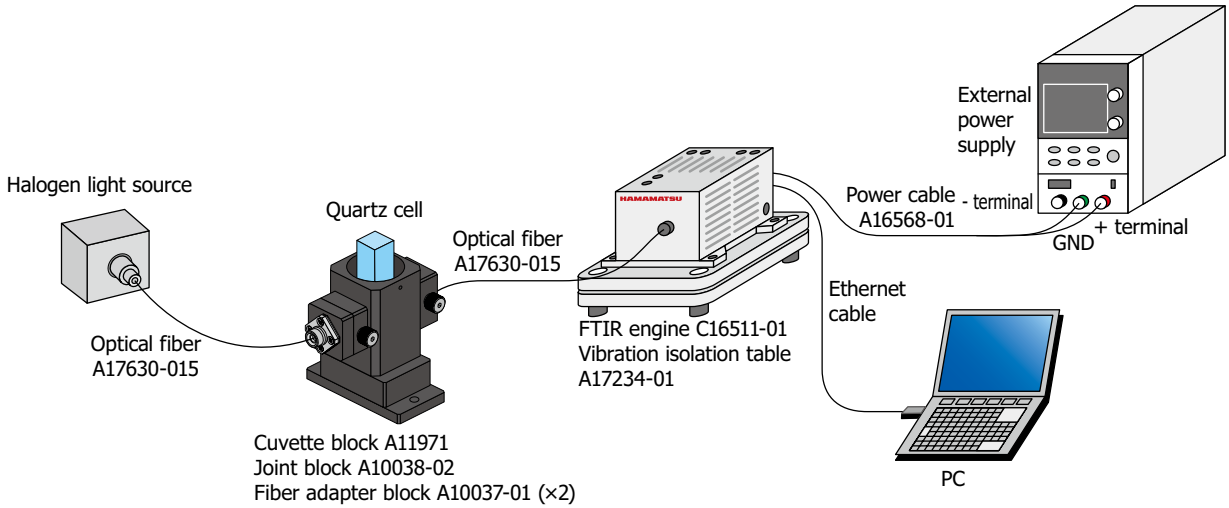
Transmission measurement



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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: ϕ28.0 mm × 35.5 mm (excluding protrusions)**
- **Long life: 7000 hr (average)**
- **High detection efficiency (built-in multiple lamps)**
- **Wide wavelength range: 400 nm to 2500 nm**

Related information

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

Precaution
· Disclaimer

Catalogs
· Selection guide / Mini-spectrometers
· Technical note / FTIR engine

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