Main specifications

Item	Model UH4150 Advanced Spec	Model UH4150
Detector	Ultraviolet and visible light regions: photomultiplier tube Near infrared region: cooled PbS	Ultraviolet and visible light regions: photomultiplier tube Near infrared region: cooled PbS
Measurable wavelength range	(Direct light detector accessory) 185 to 3,300 nm (Φ 60 standard integrating sphere accessory) 240 to 2,600 nm	(Direct light detector accessory) 185 to 3,300 nm (Φ 60 standard integrating sphere accessory) 240 to 2,600 nm
Monochromator	Grating and grating type double monochromator Pre-monochromator: Littrow monochromator using diffraction grating (2 switchable diffraction gratings) Main monochromator: Czerny-Turner monochromator using diffraction grating (2 switchable diffraction gratings)	Prism and grating type double monochromator Pre-monochromator: Littrow monochromator using a prism Main monochromator: Czerny-Turner monochromator using diffraction grating (2 switchable diffraction gratings)
Photometric method	Double-beam direct ratio photometry (Measurement of negative absorbance or transmittance/reflectance of more than 100 % is possible owing to Hitachi-original differential feedback method) Ultraviolet and visible light regions: Negative voltage control method and slit control method Near-infrared region: Slit control method and fixed slit method	Double-beam direct ratio photometry (Measurement of negative absorbance or transmittance/reflectance of more than 100 % is possible owing to Hitachi-original differential feedback method) Ultraviolet and visible light regions: Negative voltage control method and slit control method Near-infrared region: Slit control method and fixed slit method
Photometric mode	Absorbance (Abs), Transmittance (%T), Reflectance (%R), Reference side energy (E(R))/ Sample side energy (E(S))	Absorbance (Abs), Transmittance (%T), Reflectance (%R), Reference side energy (E(R))/ Sample side energy (E(S))
Photometric range	(Direct light detector accessory) Absorbance: Ultraviolet and visible light regions: -2 to 8 Abs, Near-infrared region: -2 to 5 Abs Transmittance / reflectance: 0 to 999.99, when using a 1/100 light reduction plate in the sample chamber (Φ 60 standard integrating sphere accessory) Absorbance: Ultraviolet and visible light regions: -2 to 6 Abs, Near-infrared region: -2 to 5 Abs Transmittance / reflectance: 0 to 999.99, when using a 1/100 light reduction plate in the sample chamber	(Direct light detector accessory) Absorbance: -2 to 5 Abs Transmittance / reflectance: 0 to 999.99 (Φ 60 standard integrating sphere accessory) Absorbance: -2 to 5 Abs Transmittance / reflectance: 0 to 999.99
Photometric accuracy	Certified according to NIST SRM 930 ± 0.002 Abs (0 ≤ A < 0.5 Abs), ± 0.004 Abs (0.5 ≤ A ≤ 1.0 Abs), ± 0.3 %T	Certified according to NIST SRM 930 ± 0.002 Abs (0 ≤ A < 0.5 Abs), ± 0.004 Abs (0.5 ≤ A ≤ 1.0 Abs), ± 0.3 %T
Operating temperature	15 to 35 °C	15 to 35 °C
Operating humidity	25 - 80 % (No condensation, 70 % or less at temperatures of 30 °C or higher)	25 - 80 % (No condensation, 70 % or less at temperatures of 30 °C or higher)
Size	900 (W) × 760 (D) × 1,180 (H) mm (not including handle and screw part), 900 (W) × 791(D) × 1,180 (H) mm (including handle part)	900 (W) × 760 (D) × 1,180 (H) mm (not including handle and screw part), 900 (W) × 791(D) × 1,180 (H) mm (including handle part)
Weight	160 kg	160 kg

Science for
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CAUTION: For correct operation, follow the instruction manual when using the instrument.
Specifications in this catalog are subject to change with or without notice, as Hitachi High-Tech Science Corporation continues to develop the latest technologies and products for its customers.
NOTICE: The system is For Research Use Only, and is not intended for any animal or human therapeutic or diagnostic use.
These data are an example of measurement; the individual values cannot be guaranteed.

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Smart Devices and Automotive
Optical Characteristics Evaluation System
UV-Visible/NIR Spectrophotometer

UH4150

HITACHI
Inspire the Next

Science for
a better tomorrow

Smart Devices

Features of Model UH4150 UV-Visible/NIR Spectrophotometer

Reliable and proven optical system

- Can precisely measure transmitted and reflected light due to its collimated light beam
- Optical system with minimized detector switching difference
- Low stray light and low polarization

Accessories to support a wide range of measurement requirements

- Extensive detector line-up
- Wide variety of accessories for different purposes
- Ergonomic design

Model UH4150 accessories

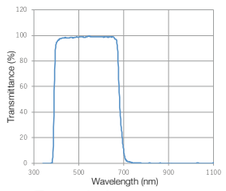
Evaluation of optical characteristics of smart devices parts

Think of the smart phone, a typical smart device - Many of its parts optical characteristics are evaluated, including the camera, face recognition module, and touch screen.

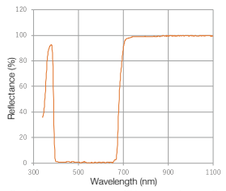
Part	Relevant component	Measurement classification	Accessory
Digital camera (RGB camera)	Micro lens	Transmittance	Transmittance Measurement Accessory for Micro Samples (P/N:1J0-0204)
			60 mm Standard Full Integrating Sphere (P/N:1J1-0122)
	IR cut filter	Transmittance	Transmittance Measurement Accessory for Micro Samples (P/N:1J0-0204)
		Reflectance	Continuously Variable Angle Absolute Reflectance Accessory(P/N:1J1-0131)
	AR coating	Reflectance	5° Specular Reflectance Accessory (Absolute) (P/N:134-0102)
	CMOS sensor	Reflectance	Continuously Variable Angle Absolute Reflectance Accessory (P/N:1J1-0131)
Face recognition sensor (IR camera)	Micro lens	Transmittance	Transmittance Measurement Accessory for Micro Samples (P/N:1J0-0204)
			60 mm Standard Full Integrating Sphere (P/N:1J1-0122)
	Optical filter	Transmittance	Accessories for UH4150 Direct Light Detection System (P/N: Please ask local distributor)
Touch screen	AR coating	Reflectance	5° Specular Reflectance Accessory (Absolute) (P/N:134-0102)
	Long light path measurement	Transmittance	Large Sample Holder for Long Path Measurement (special order)
	Polarizing film	Transmittance	Auto polarizer plate measurement accessory (special order)

Application examples

Measurement of IR cut filter for digital camera use



Transmission spectrum

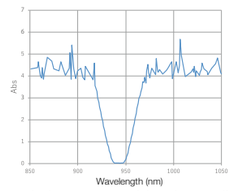


Reflection spectrum (5° specular reflection)

Filters are used in CCD and CMOS image sensors to cut the infrared light that negatively impacts image quality and to allow visible light to pass through. Since micro size parts are used, measurements can be made using a transmittance measurement accessory for micro samples and a small 5° specular reflectance accessory. Low-noise data can be obtained using such specialized accessories.

Measurement of IR filter for face recognition

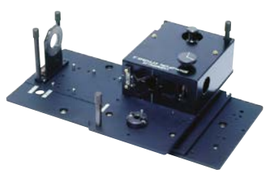
Direct light detector accessory



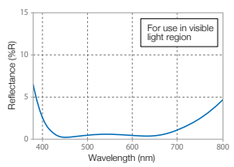
Transmission spectrum (absorbance display)

Systems using infrared ray detection have become the mainstream for face recognition security. To remove the effects of external light on the sensor, a bandpass filter is used to allow only infrared light to pass through. The Model UH4150 Advanced Spec can precisely measure the high transmittance in the transmitted wavelength region and the low transmittance in the shielded wavelength region by employing a low-stray-light optical system. For this kind of measurement, a highly sensitive incidence detector accessory is employed.

Measurement of the low reflection process for displays (AR coating)



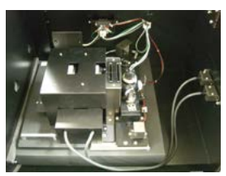
5° specular reflectance accessory



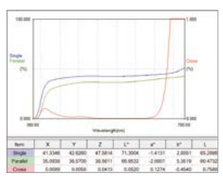
Reflection spectrum (5° specular reflection)

To reduce ghosting and flare due to reflection, an antireflection (AR) coating is deposited on camera lenses and covering glass. The UH4150 can measure the reflection spectrum of AR coatings using the 5° specular reflectance accessory. High-precision measurements can be made even for low reflectance values of 1 % or less.

Measurement of transmittance of polarizing film



Automatic polarization accessory



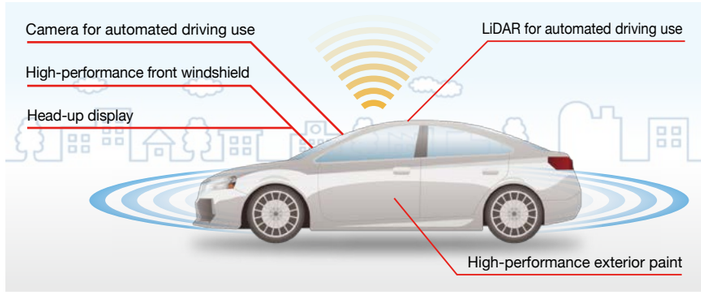
Transmission spectrum of polarizing film

A polarized sample can be automatically measured in the parallel and crossed-Nicol (orthogonal) configurations using an automated polarization accessory (special order). Transmittance is at its lowest in the crossed-Nicol configuration. Even so, because automatic detection is carried out using the smallest interval of 0.01° when in this orientation, measurements can be made with high reproducibility.

Automotive

The UH4150 allows optical evaluation of parts that are needed for automated driving and improved safety!

Model UH4150
UV-Visible/NIR Spectrophotometer



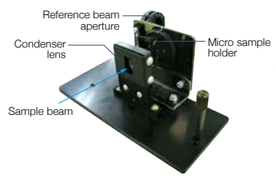
Evaluation of automobile-related components

There is an increasing need to evaluate the optical characteristics of high-visibility sensors and displays for automated driving, in addition to high-performance internal and external materials.

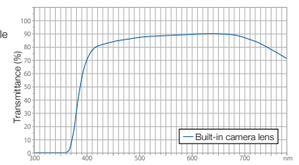
Part		Relevant component	Measurement classification	Accessory
Autonomous sensor	Camera (LiDAR)	Lens	Transmittance	Transmittance Measurement Accessory for Micro Samples (P/N:1J0-0204)
				60 mm Standard Full Integrating Sphere (P/N:1J1-0122)
		IR cut filter	Transmittance	Transmittance Measurement Accessory for Micro Samples (P/N:1J0-0204)
		Optical filter	Transmittance / Reflectance	Continuously Variable Angle Absolute Reflectance Accessory (P/N:1J1-0131)
		CMOS camera	Reflectance	Continuously Variable Angle Absolute Reflectance Accessory (P/N:1J1-0131)
		NIR transmission external cover	Transmittance / Reflectance	Continuously Variable Angle Absolute Reflectance Accessory (P/N:1J1-0131)
Display	(Head-up display) (Instrument panel)	AR coating	Reflectance	Continuously Variable Angle Absolute Reflectance Accessory (P/N:1J1-0131)
		Cold mirror	Transmittance / Reflectance	Continuously Variable Angle Absolute Reflectance Accessory (P/N:1J1-0131)
		Half mirror	Transmittance / Reflectance	Continuously Variable Angle Absolute Reflectance Accessory (P/N:1J1-0131)
Interior and exterior	(Front windshield, side and rear windows) (Dashboard) (Exterior color)	IR cut glass	Transmittance / Reflectance	Transmittance Holder for Large Sample (P/N:1J0-0214)
		UV cut glass	Transmittance / Reflectance	Transmittance Holder for Large Sample (P/N:1J0-0214)
		Heat-shielding paint	Reflectance	60 mm Standard Integrating Sphere (P/N:1J1-0120)
				150 mm Standard Integrating Sphere with Optical Trap (P/N:1J0-0212)

Application examples

Measurement of transmittance of built-in camera lens



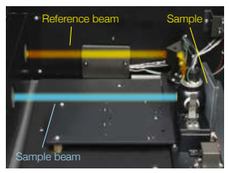
Transmittance measurement accessory for micro samples



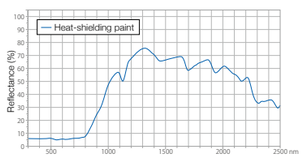
Transmission spectrum of built-in camera lens

A sample holder for the built-in camera lens can be specially ordered.
This lens offers high visible-light transmittance.

Measurement of solar reflectance of high-performance exterior paint



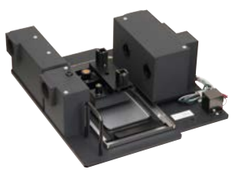
Φ 60 standard integrating sphere accessory



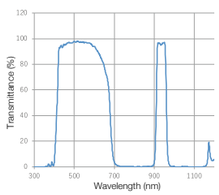
Total reflection spectrum of heat-shielding paint

The total reflectance of heat-shielding paint can be measured by placing samples at the rear of the integrating sphere. The solar reflectance can be calculated automatically using an optional package.

Measurement of UV/VIS/NIR transmittance of dual bandpass filter



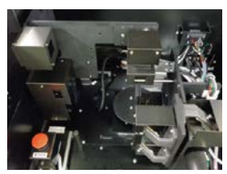
Direct Light detector accessory



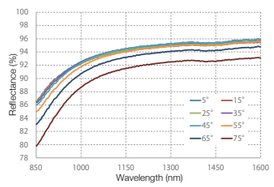
Transmission spectrum

While various systems have been developed for LiDAR, the method studied here simultaneously acquires a color camera image using visible light and distance information using a 940 nm infrared light source. In this system, unwanted light that causes noise is blocked and a dual bandpass filter is used to allow visible light for the camera and near-infrared light for the LiDAR to pass through. The model UH4150 can perform high-precision measurements of samples that have high and low transmittance in the ultraviolet, visible, and near-infrared regions.

Variable angle reflectance measurement of LiDAR plane mirror for automated driving



Continuously variable angle absolute reflectance automatic accessory



Incident angle dependence of reflectance

High reflectance at high incident angles is required for mirrors used with LiDAR. The reflectance of an Aluminium mirror was measured at incident angles of 5° to 75° using the Continuously Variable Angle Absolute Reflectance Automatic Accessory(special order).