C101-E169

SHIMADZU
Excellence in Science

UV-VIS Spectrophotometer

UV-2600i
UV-2700i

Don’t Miss Any Piece of the Puzzle

UV-i Selection

UV-1900i

UV-2600i/2700i

UV-3600i Plus

SolidSpec™-3700i

Perfect for a Wide Variety of Applications

Spectral evaluation function enables unique pass/fail judgment for quality control.

During measurements, data can be automatically sent to Excel® in real time for using macros to automatically obtain desired values.

Measures Slight Differences in Absorbance

Scalability to near-infrared measurement.

Ultra-low stray light enables measurements down to absorbance values of 8 Abs.

Enables Compliance with ER/ES Regulations and Stronger Data Management.

Configurable as system for preventing data tampering.

Efficiently prevents data tampering from entire series of analytical process steps.

Single monochromator UV-2600i
Double monochromator UV-2700i

Extensive Selection of Application Programs for a Wide Variety of Applications

The functionality of the UV-2600i / 2700i can be freely expanded to suit the measurement objective. By accommodating a wealth of accessories, the system can address any user's applications and a variety of situations. In addition, with intuitive operations, anyone can easily obtain the data required.

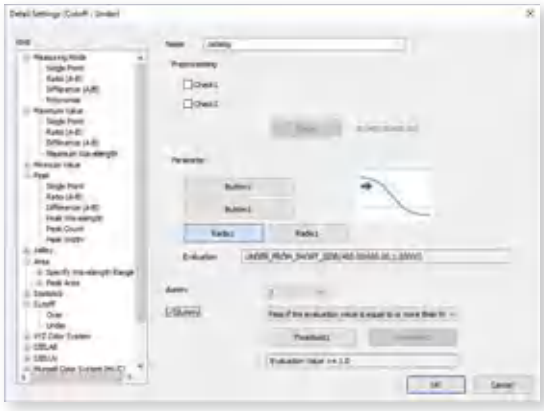
	UV-2600i	UV-2700i
Electricity, Electronics, and Optics		
High-level absorbance measurements for polarization films	F	E
Absolute reflectance measurements for anti-reflective films	E	F
Transmittance measurements for functional films	E	E
Transmittance measurements for solar cell cover glass	E	F
Band gap measurements and diffuse reflectance measurements for semiconductor materials	E	F
Absolute reflectance measurements for highly reflective mirrors	E	F
Chemicals		
Transmittance and reflectance measurements for various types of films	E	F
Thin film thickness measurements	E	E
Plastic transmittance measurements, reflectance measurements, and color measurements	E	F
Medicines, Cosmetics, and the Life Sciences		
Raw material confirmation tests	E	E
Enzyme reaction measurements	E	E
Protein and nucleic acid quantitation	F	E
Cosmetic color measurements and ultraviolet screening measurements	E	F
Evaluation of optical properties of nanoparticles	E	F

	UV-2600i	UV-2700i
Environment		
Hexavalent chromium quantitation	F	E
Quantitation of total phosphorus and total nitrogen in river water, lakes, and marshes	F	E
Turbidity measurements	E	F
Quantitation of iron, copper, arsenic, ammonia, and other substances in water	F	E
Construction		
Transmittance measurements for window glass and window glass films	E	F
Reflectance measurements for paints and building materials	E	F
Textiles		
Textile transmittance and reflectance measurements, and ultraviolet screening measurements	E	F
Textile color measurements	E	F
Evaluation of cellulose nanofibers (CNF)	E	F
Foods		
Quantitation of vitamins, food additives, and minerals	F	E
Quantitation of phenols leached from containers and packing agents	F	E

E: excellent F: fair

Automated Data Processing

After spectra are measured, data processing can be performed and results displayed automatically according to a customized evaluation method. Multiple evaluation criteria can be configured.

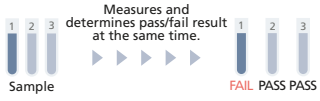


The method used to calculate evaluation values can be selected from a variety of 33 standard evaluation methods (arithmetic calculations, peak/valley, area, or statistical calculations) or customized.
Pass/fail criteria can also be selected from eight types (such as pass if greater than or equal to, less than or equal to, greater than, or less than a specified value).

Previous
Checked/decided by looking at peak values or spectra.

LabSolutions UV-Vis
Decided by software based on data.

By specifying various evaluation criteria for measurement results, spectra judgments can be made automatically.

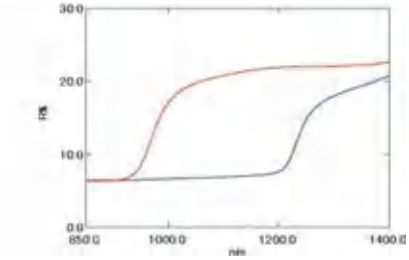


Electricity, Electronics, and Optics — Band Gap Measurements for Semiconductors

The diffuse reflection spectra for two types of semiconductors (red line: $CuIn_{0.5}Ga_{0.5}Se_2$, blue line: $CuInSe_2$) used as solar cell materials have been measured using the ISR-2600Plus integrating sphere. It is evident that the absorption edge (position where the reflectance drops) differs depending on the sample. This difference signifies a difference in the band gap* for these samples. (The samples were provided by Wada Laboratory, Faculty of Science and Technology, Ryukoku University.)

The band gaps for the samples were calculated utilizing the Tauc method. The results obtained were 1.27 eV for $CuIn_{0.5}Ga_{0.5}Se_2$ (red line) and 0.99 eV for $CuInSe_2$ (blue line).

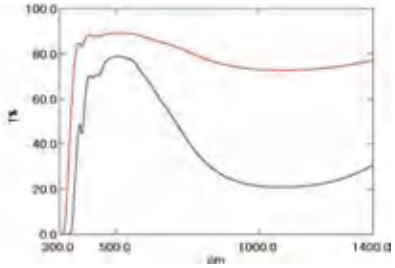
* The term band gap refers to the energy difference between the top of the valence band, which is full of electrons, and the bottom of the conduction band, which does not contain electrons.



Construction — Window Glass Transmittance Measurements

Two types of window glass were measured utilizing the ISR-2600Plus integrating sphere. The sample shown by the red line is highly transparent to near-infrared light at 800 nm or more.

The sample shown by the blue line, however, is apparently not very transparent to near-infrared light.

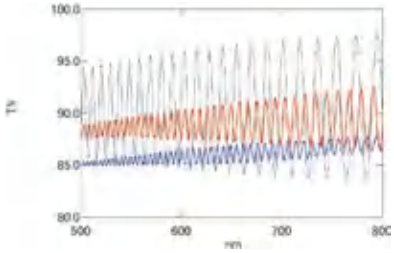


Chemicals — Thickness Measurements of Cling Films

Undulating interference waveforms sometimes occur if light is passed through a film. The film thickness of a sample can be determined by using these interference waveforms. The black line shows transmittance data for polyvinylidene chloride film, the red line for nylon film, and the blue line for polypropylene film.

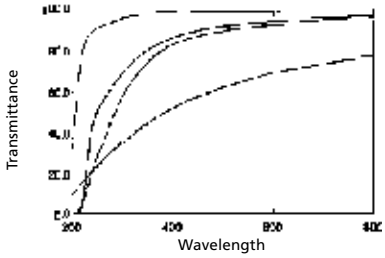
By using the optional thickness calculation software, the interference waveforms were calculated to be 10.0 µm, 17.0 µm, and 21.4 µm, respectively.

(Caution) The sample's refractive index must be entered for the film thickness calculation.



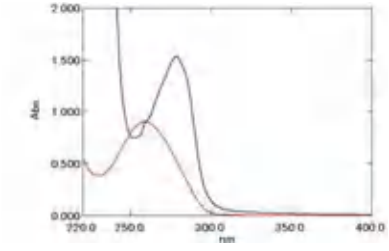
Textiles — Evaluation of CNF

An ISR-2600Plus integrating sphere was used to measure the total transmittance spectrum of cellulose nanofiber (CNF). Depending on the raw materials used, spectra can vary, transparency can vary, and spectral tendencies in the ultraviolet region can vary.



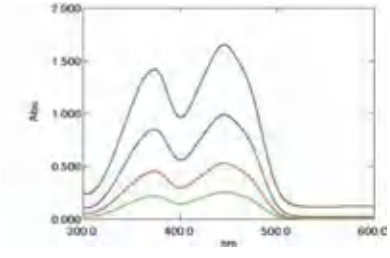
Life Sciences — DNA and Protein Measurements

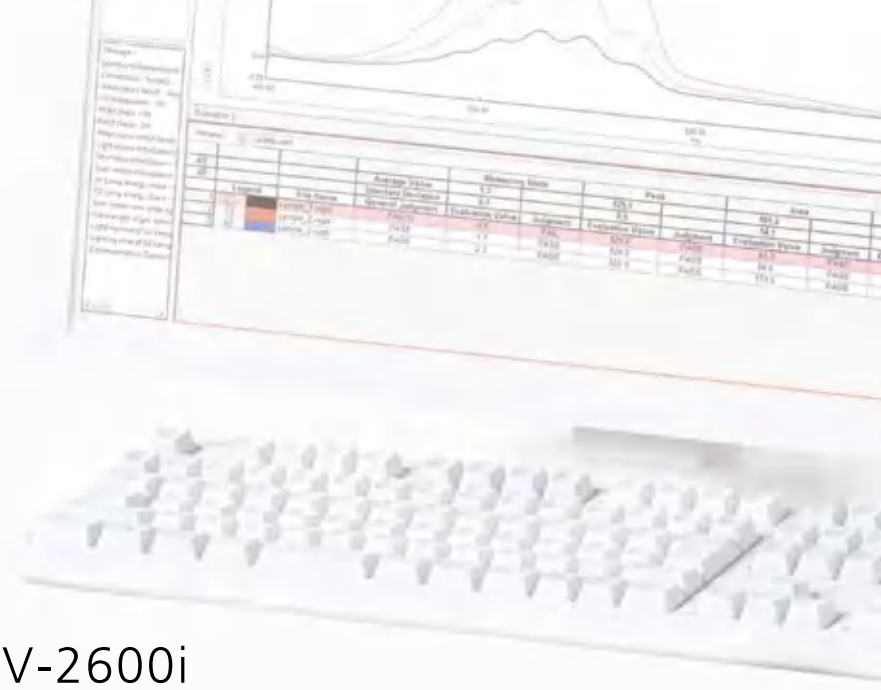
The red and blue lines are the absorption spectra for dsDNA and BSA (bovine serum albumin), respectively. The concentration values are 45 ng/µL for dsDNA and 2.2 mg/mL for BSA.



Foods — Vitamin Measurements

This shows the absorption spectra for riboflavin (vitamin B_2). The sample concentrations are, in order from the highest absorbance, 0.08, 0.04, 0.02, and 0.01 mg/mL.





Single monochromator UV-2600i

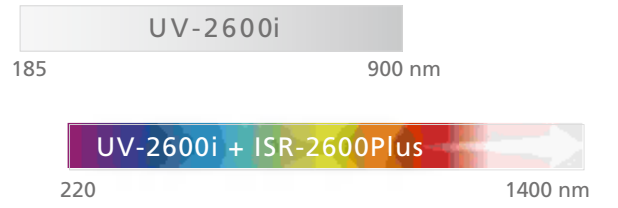
Scalability to near-infrared measurement

A key feature of the UV-2600i single monochromator system is its measurement wavelength range. By using the optional ISR-2600Plus Integrating Sphere attachment, the measurement wavelength range can be extended from 220 nm to 1400 nm, significantly expanding its applications.

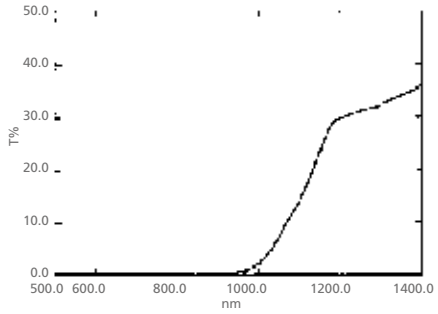
Integrating Sphere Enables Measurements to 1400 nm

The UV-2600i is also equipped with Shimadzu's proprietary Lo-Ray-Ligh grade diffraction grating, which achieves high efficiency and low stray light levels. By installing the ISR-2600Plus two-detector integrating sphere, the 300 nm to 1100 nm wavelength range of conventional models can be extended to 1400 nm. In addition, the UV-2600i achieves a significant noise reduction, and can accommodate measurements of solar cell anti-reflective films and polycrystalline silicon wafers.

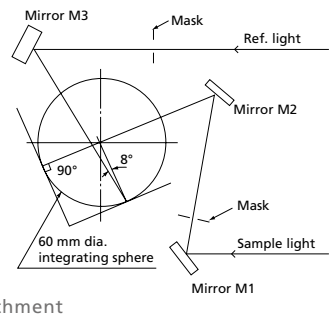
Wider Measurement Wavelength Range UV-2600i



Transmittance Measurements of Polycrystalline Silicon Using the ISR-2600Plus UV-2600i



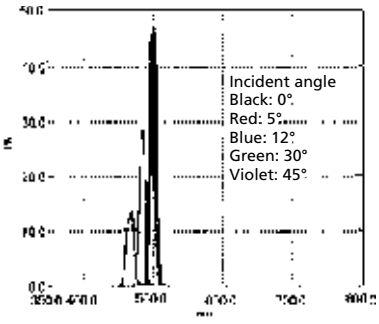
This is a transmittance measurement of polycrystalline silicon. Since the system is capable of measurements to 1400 nm, the transmission characteristics of the band gap region (near 1000 nm) are clearly evident.

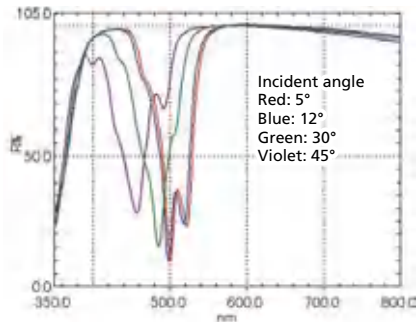


ISR-2600Plus Integrating Sphere Attachment

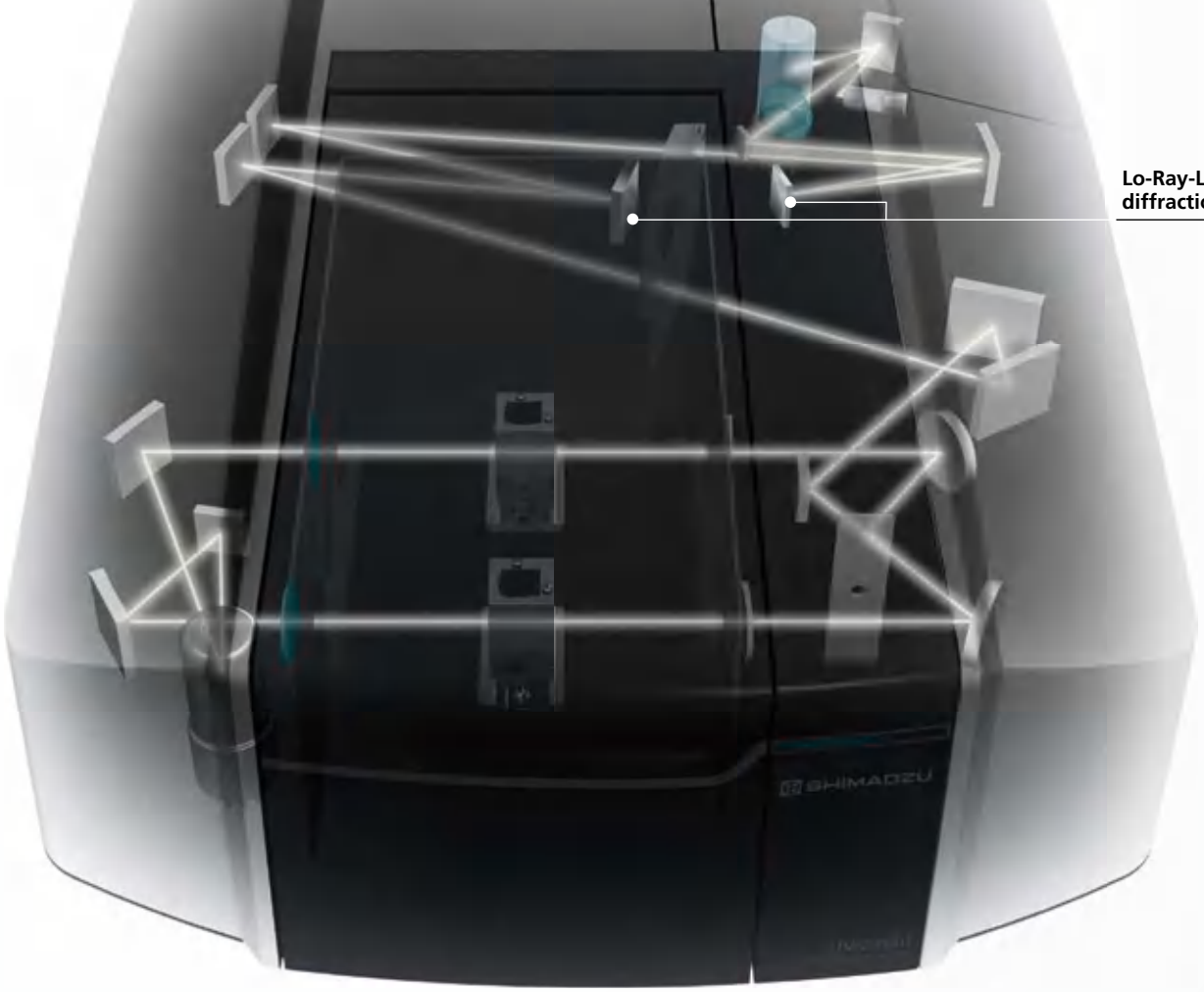
Transmittance/Reflectance Measurements of Multilayer Dielectric Film While Varying Angle of Incidence Using Variable Angle Measurement Unit for MPC-2600A UV-2600i

Variable Angle Measurement Unit





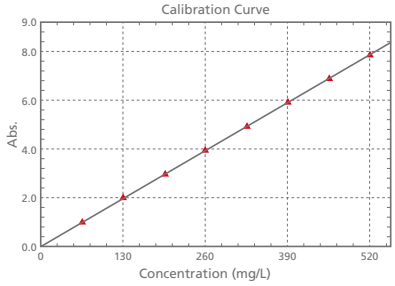
These measurement results from a multilayer dielectric film show the transmittance on the left and reflectance on the right.
The results confirm that varying the incident angle changes the center wavelength of transmitted and reflected light.



Achieves Ultra-Low Stray Light, Enabling 8 Abs Measurements

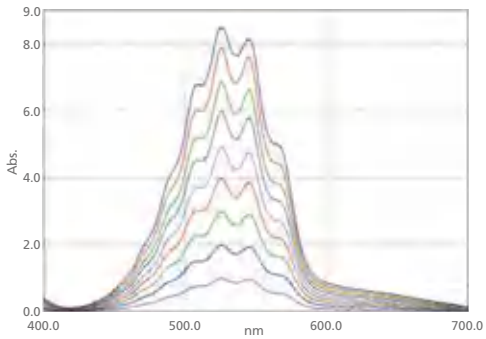
In the case of a device equipped with a general double monochromator, the absorbance that can be covered is about 5 to 6, but the UV-2700i offers a range to 8 Abs, with a transmittance value of 0.000001 % (1 part in 100 million). This system achieves high-level absorbance measurements with incomparable precision. In addition to measuring even high-concentration samples as is, eliminating the need to dilute samples, the system can be applied to evaluating the transmission characteristics of polarization films. Wavelengths in the 400 nm to 650 nm range can be measured to 8 Abs.

Absorbance Linearity UV-2700i

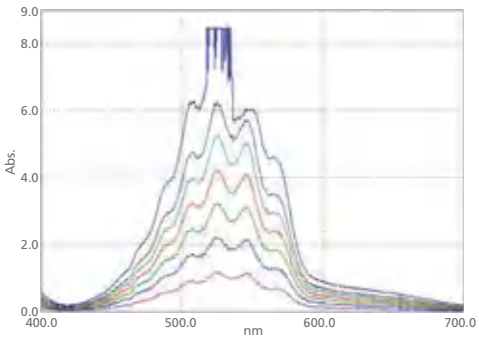


This shows the relationship between the absorbance and the concentration of an aqueous potassium permanganate solution. Good linearity is evident to 8 Abs.

Spectral Comparison of Aqueous Potassium Permanganate Solutions UV-2700i



UV-2700i



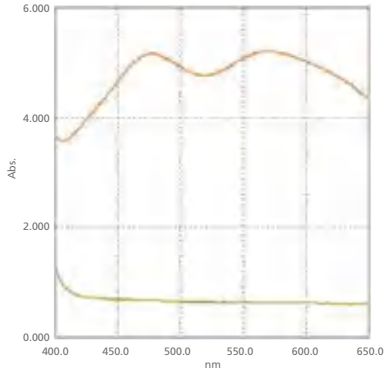
General double monochromator system

Double monochromator UV-2700i

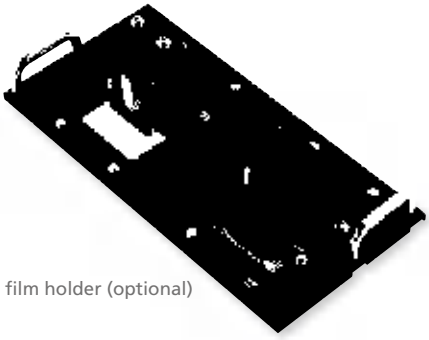
Measures Slight Differences in Absorbance

Equipped with a double monochromator that achieves ultra-low stray light levels, the UV-2700i is optimal for measuring low transmittance samples, such as polarization films used for LCD panels. The UV-2700i is capable of 8 Abs measurements, and can make accurate transmittance measurements to 1 part in 100 million, accommodating a variety of sample measurements.

Example of Polarization Film Measurement UV-2700i



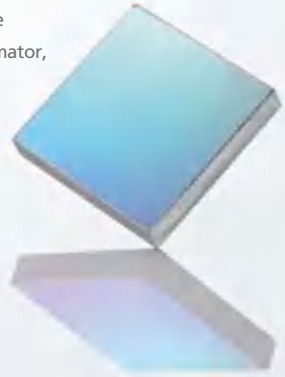
With the rotating film holder (photograph below), two film samples can be set on the same optical axis. In this example, the polarization film is rotated in the plane, and the transmittance is measured when the film transmits and blocks light.



Rotating film holder (optional)

Equipped with Shimadzu's Proprietary Lo-Ray-Ligh™ Grade Diffraction Grating

Shimadzu's proprietary Lo-Ray-Ligh grade diffraction grating enables the high precision of the UV-2600i/2700i. In the diffraction grating production process, new proprietary manufacturing methods have been developed for Shimadzu's holographic technology. By optimizing the etching process, we have successfully manufactured extremely low stray light diffraction gratings while maintaining high efficiency. With this newly designed optical system equipped with a double Lo-Ray-Ligh monochromator, the UV-2700i achieves unparalleled ultra-low stray light levels.



LO-RAY-LIGH
Low Stray Light Diffraction Gratings

Enables Compliance with ER/ES Regulations and Stronger Data Management

LabSolutions™ UV-Vis Software

Enables higher productivity and provides for a more convenient analytical environment.

ANALYTICAL INTELLIGENCE

Setting Parameters

Smooth Operability

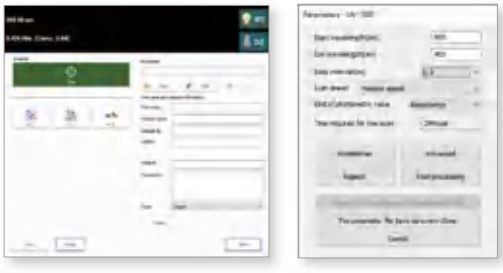
Four Measurement Modes

Four separate measurement modes: spectral, quantitative, photometric, time-course, automatic measurement (optional) enable measurements to be performed using intuitive operations.

Four Measurement Mode Windows

Instrument Control Panel

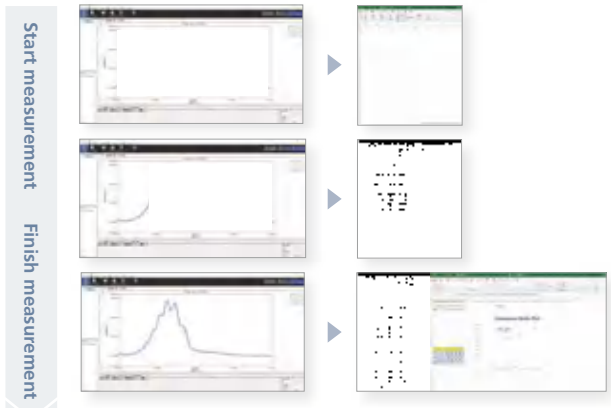
Instrument parameter settings can be specified via panels that are separate from the measurement window. The control panels include various functionality that is laid out for superior visibility. Each measurement window connects seamlessly to the corresponding parameter settings window.



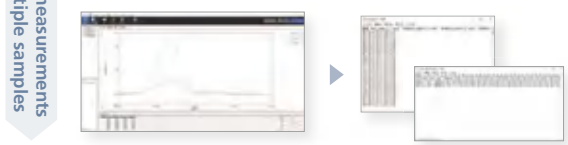
From Measurement to Data Output

Improved Productivity of Data Analysis Operations

Data analysis and data output operations can be performed at the same time (simultaneously) as data measurement. Time spent outputting or analyzing data can also be reduced by simultaneously sending data to an Excel® spreadsheet in real time or saving data as text. The software can also automatically perform post-processing of measured data, such as processing/correcting spectra, and perform pass/fail judgments of measurement results (automatic spectral evaluation).



Analyze data in Excel® concurrently with data measurement (Excel® data analysis real-time transfer function)

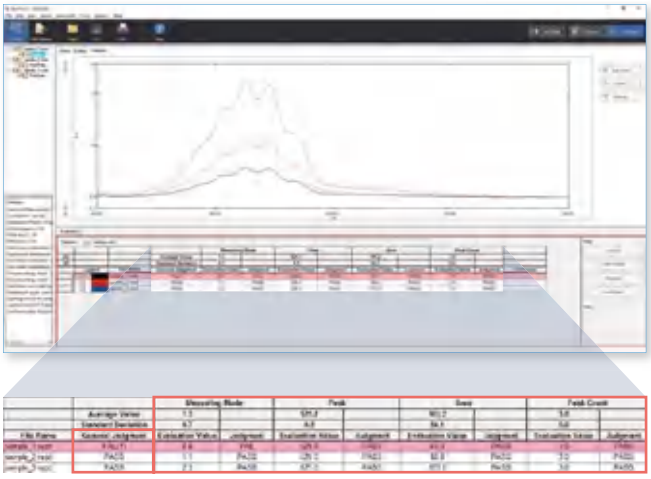


Also easily transfer data to external data analysis software (simultaneous text saving and matrix output functions)

Data Management

Automatic Spectral Evaluation (Spectral Evaluation Function)

By specifying various evaluation criteria for measurement results, spectra judgments can be made automatically.



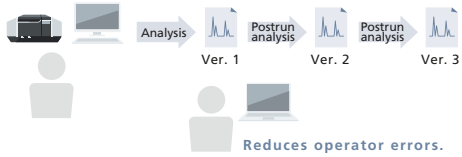
In the report creation window, reports can either be prepared based on a previously specified report format or freely laid out based on various parameters, data, or other elements.

Stronger Data Management

In addition to regular file management in folders on a PC, ideal solutions for saving data in a database with sophisticated security functionality and compliance with ER/ES-related regulations are also available (optional LabSolutions DB UV-Vis and LabSolutions CS UV-Vis software).

Database Management

Managing data in a database can prevent the overwriting or deletion of analysis data. Furthermore, during postrun analysis, the data can be managed using version numbers, so there are no concerns about overwriting the data.



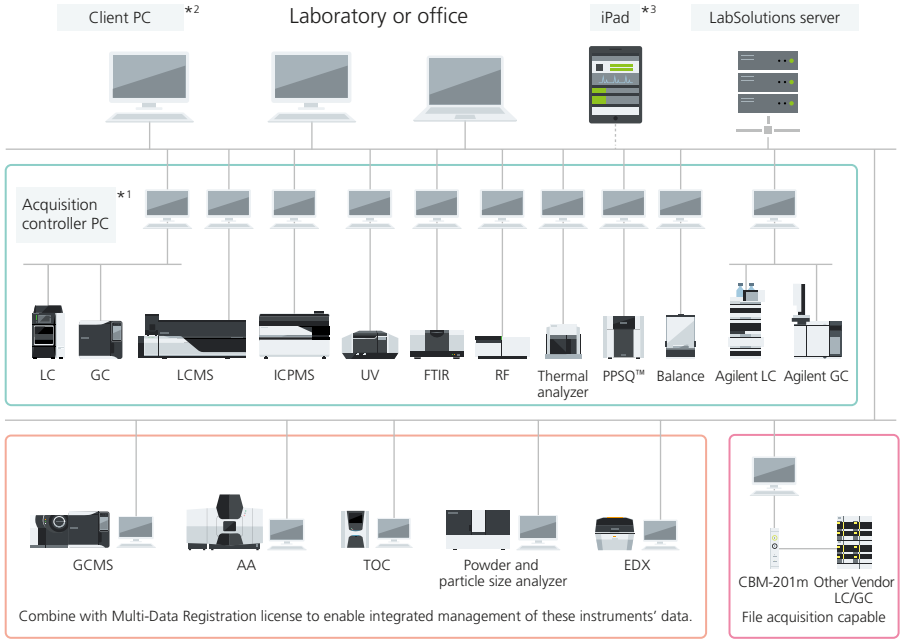
Validation Software

Equipment performance can be easily checked in daily inspections and when data accuracy becomes a concern. The user can select confirmation of instrument performance indicators as per JIS K0115 General rules for molecular absorptiometric analysis, as well as the general test methods in the Japanese Pharmacopeia and various EP and USP inspections. (Order inspection jigs and reagents separately.)

Stronger Data Management Comprehensive Data Integrity Compliance

The system enables full compliance with data integrity requirements, not only for chromatography equipment, but also UV-VIS spectrophotometers and other spectral analysis instruments.

LabSolutions CS/DB UV-Vis provides compliance for regulations concerning electronic record keeping and electronic signatures required by FDA 21 CFR Part 11 and other regulations stipulated by Japan's Ministry of Health, Labour and Welfare (ER/ES regulations). Additionally, since the software supports laboratory networking, analytical results from a broad variety of analytical instruments used in the laboratory, including LC, LCMS, GC, GCMS, ICPMS, FTIR, RF, EDX, TOC, and PPSQ and so on, can be managed centrally from a server.



Network System: LabSolutions CS

LabSolutions CS can freely access all instruments on the analytical network, so that all analytical data is managed on the network server and the data can be loaded to any computer connected to the network. This is especially recommended for customers that have many users and want to manage data on a server together with LC, GC, FTIR, UV, RF, EDX, TOC, PPSQ, and other data for ER/ES compliance.

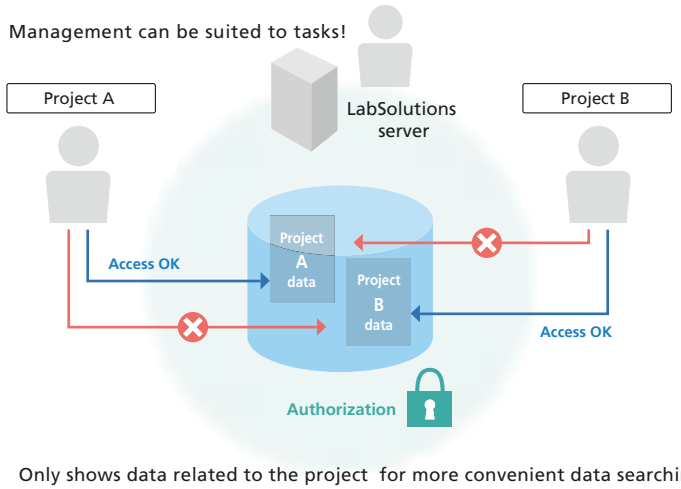
Standalone Database System: LabSolutions DB

This configuration does not require a network connection and is ideal for customers that want to manage all data on one computer for ER/ES compliance only.

*1 The acquisition control PC controls analytical instruments. It can also be used to send analytical instructions and perform postrun analysis, just like a client PC.
*2 If a terminal service is used, then LabSolutions software does not need to be installed on client PCs.
*3 If an iPad is used, then XenApp from Citrix must be installed.

Pertinent Information is Managed for Every Project

LabSolutions DB UV-Vis and CS UV-Vis provide a project management function enabling management suited to tasks and system operations. This function enables equipment and user management, security policy, and data processing to be set on a project by project basis, thereby improving the efficiency of data searches and management tasks.



Only shows data related to the project for more convenient data searching.

Visualization of a Series of Analysis Operations

Creating a report set* provides visibility of the individual analytical operations involved in the overall analytical process. When analytical operations are visible, it is easier to check for operating errors, which helps improve the efficiency and reliability of checking processes.

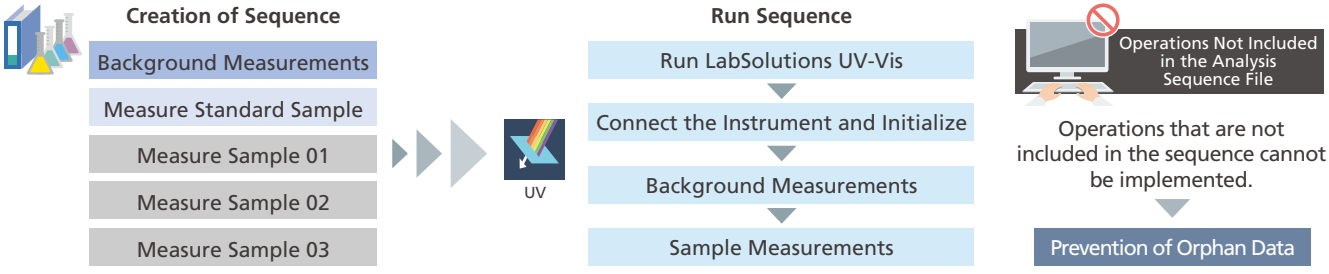
* Report sets include test methods and test results for a series of samples analyzed, and also a corresponding operation log (a record of all operating events from login to logout), which is automatically extracted from the data and summarized in a single report.

Analysis Sequence Optional

Ensuring data integrity requires a system that shows no data manipulation has occurred. Shimadzu has achieved this through the introduction of its Analysis Sequence for spectrometers. Using the Analysis Sequence, it is possible to verify that the full chain of analysis has been carried out according to an experimental protocol (or SOP).
The LabSolutions Analysis Sequence (optional) provides a three-step workflow:

1. **A sequence is put together according to a given experimental protocol (or SOP). See the flow below for reference.**
2. **The operator conducts analysis in the order shown by the sequence file.**
3. **After analysis, a report set is created from the sequence file used in the analysis. The experiment leader uses the report set to review the data chain generated by the sequence.**

Until now, a problematic issue with data integrity in spectrometers has been the existence of orphan data (data which is isolated and not reviewed, despite being used in the analysis). However, the LabSolutions Analysis Sequence option not only meets the requirements for data integrity by preventing the creation of orphan data, but also allows for highly efficient spectrometer operation.



Optional Software

An autosampler can be used to automate analysis in order to avoid the trouble of having to replace cells and enable simultaneous analysis of many samples.

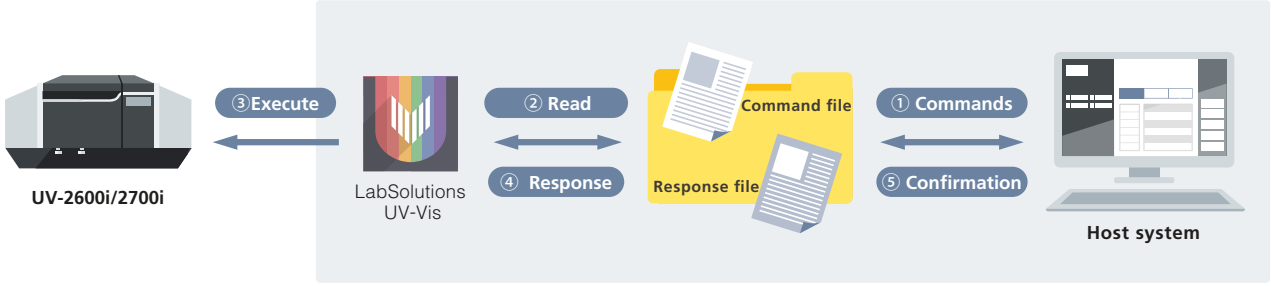
Measurements Automated with Automatic Control

Automatic control satisfies needs of customers that want to link the spectrophotometer to non-Shimadzu instruments or operate the spectrophotometer from the LabSolutions UV-Vis software without operator intervention.

Automatic Control of Shimadzu UV Instruments

Automatic control functionality is used by LabSolutions UV-Vis to successively perform operations automatically in order of the assigned commands, without an operator having to click buttons or enter characters in software windows with a mouse or keyboard.

Using this functionality enables automated system analysis, permits execution of specific operations, such as start/stop operations that do not require an operator performing the operations in a window, and can achieve a system that prevents human errors.



Commands are text files that can be used to configure specialized systems. By placing simple text files that contain a list of commands in a folder, LabSolutions UV-Vis automatically reads the commands contained in the file, loads the parameter settings file, performs baseline corrections, measures the spectrum, or performs other processes automatically.

Optional

Autosampler Used for Continuous Analysis of Up to 360 Samples

If used in combination with an ASX Series autosampler for automatic analysis, up to 360 samples can be automatically analyzed continuously. Furthermore, the spectral evaluation function can be used to navigate the entire process from measurement to data analysis.

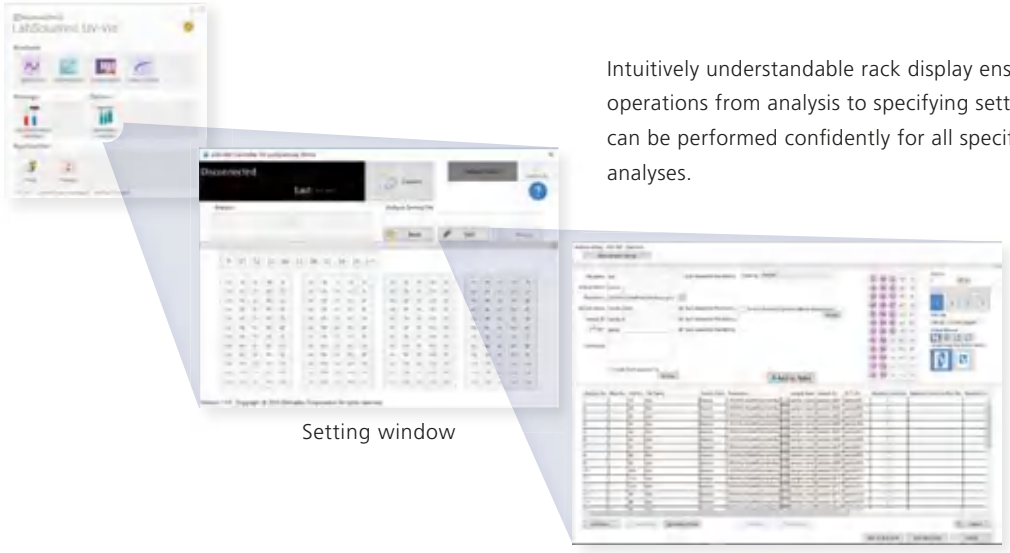
Previous
100 samples/day

UV-Vis [Automatic Analysis]
360 samples before noon

Select automatic analysis

Set parameter setting

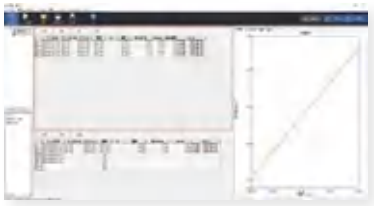
Measure, quantify, analyze data



Setting window

Automatic analysis application screen

Intuitively understandable rack display ensures operations from analysis to specifying settings can be performed confidently for all specified analyses.



Either the quantitation mode, spectrum mode, or photometric mode can be selected for continuous analysis. In combination with the spectral evaluation function, it is also possible to quickly determine pass/fail results visually after measuring multiple samples.

UV Automatic Analysis System
ASX-560 + UV-2600i + Sipper Unit

For automatic multianalyte analysis of 240 analytes

ASX-560 Autosampler

(P/N 211-94230-01)

Sample containers and number of samples:
- 10, 50-mL containers (standard samples) or 240, 14-mL containers
- 360, 7-mL containers (rack sold separately)
- 160, 20-mL containers (rack sold separately)
- 84, 50-mL containers (rack sold separately)

Size: W580 × D550 × H620 mm (main unit) (including sample probe)

For automatic multianalyte analysis of 120 analytes

ASX-280 Autosampler

(P/N 211-94412)

Sample containers and number of samples:
- 10, 50-mL containers (standard samples) or 120, 14-mL containers
- 180, 7-mL containers (rack sold separately)
- 80, 20-mL containers (rack sold separately)
- 42, 50-mL containers (rack sold separately)

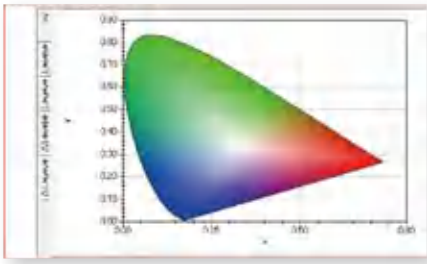
Size: W355 × D550 × H620 mm (main unit) (including sample probe)

Optional Software

Optional software adds various data analysis functions to the spectral evaluation function in LabSolutions UV-Vis. Pass/fail criteria can also be specified for data analysis results.

Color Calculation Software

(P/N 207-24528-91)

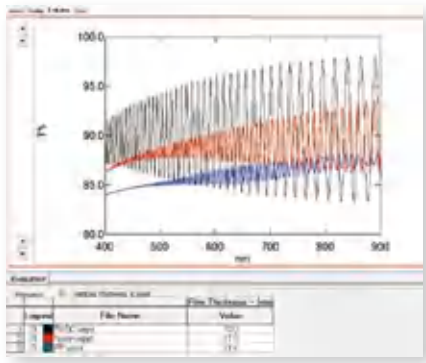


This software is used to calculate the color value of measured substances based on measured spectra. It can also display color diagrams, such as by plotting color coordinates in an XYZ color system or plotting CIELAB lightness index or color coordinate values.

- It includes the major calculation parameters, such as the XYZ color system, CIELAB, CIELUV, Munsell color system, mentalism, yellowness, whiteness, and color difference.
- Colors relevant to JIS and ASTM standards can be calculated.*
- Measurement illuminants, viewing angle, and other parameters can be specified for the various types of calculation.

Film Thickness Calculation Software

(P/N 207-25804-91)

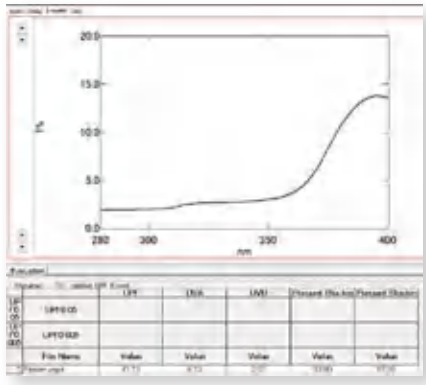


This software is used to calculate film thickness from measured spectra based on the interference interval method. (Calculating the film thickness requires entering the refractive index of the sample.)

- The interference interval method calculates the film thickness based on the interval between interference peaks (or valleys). The incident angle and wavelength range for film thickness calculations and peak (or valley) detection parameters can be specified.

UPF Calculation Software

(P/N 207-25806-91)



This software is used to calculate ultraviolet protection factor (UPF) values based on measured spectra.

- It can calculate UPF, UVA, UVB, and ultraviolet protection values for either UVA and UVB.
- Values relevant to JIS, DIN, BS, AATCC, AS/NZAA, or GB/T standards can be calculated.*

Automated Analysis Software

(P/N 207-25807-91)

This software controls the ASX-560/280 autosampler.
CETAC connection kit is required to connect the device to the ASX separately.

Solar Radiation Calculation Software

(P/N 207-25805-91)

This software is used to calculate solar transmittance/reflectance based on measured spectra.

- It includes major calculation parameters, such as visible light transmittance/reflectance, total light transmittance/reflectance, near-infrared reflectance, ultraviolet ray transmittance, CIE damage factor, and skin damage factor.
- Parameters relevant to JIS, ISO, and GB/T standards can be calculated.*

* For more details about applicable standards, contact Shimadzu.

Guide to Selecting Accessories

In order for UV-Vis and NIR spectrophotometers to perform their full functions, it is necessary to select the appropriate accessories for the application field and sample properties. A wide variety of accessories are available to support a wide range of applications, from basic measurement such as transmission and relative/absolute reflection measurement, to multi-sample and micro-sample measurement. Please refer to the *UV-VIS Series Accessories* handbook (C101-E070) for details.

■ Liquid Samples

Samples	Measurement Method and Conditions			Accessories
Transparent Samples	Sample volume: 2.5 mL min.			Standard Sample Compartment + 10 mm Cell
	Micro-volume measurement		1 mL min.	Semi-Micro Cell + Micro Cell Holder with Mask
			500 µL min.	Micro Cell + Micro Cell Holder with Mask
			50 µL min.	Super-micro Cell + Super-micro Cell Holder
			For automatically measuring samples in multiple cells	MMC-1600 8/16 Series Micro Multi-Cell Holders and Cells
	Samples with high absorbance, but that are difficult to dilute (short optical path measurement)			Short-Path Cell (1, 2, 5 mm) + Spacer for Short-Path Cell
	Samples with low absorbance, but that are difficult to concentrate (long optical path measurement)			Long-Path Cell (20, 30, 50, 100 mm) + Long-Path Rectangular Cell Holder
	For automatically measuring samples in multiple cells	Normal measurement		Multi-Cell Sample Compartment (sample volume: 2.5 mL min.)
		Small sample volumes (50 µL min.)		MMC-1600 8/16 Series Micro Multi-Cell Holders and Cells
		Requires temperature control		CPS-100 Six-Cell Thermoelectrically Temperature-Controlled Cell Positioner (sample volume: 2.5 mL min.)
	For temperature-controlled measurements (constant-temperature measurement)	Temperature-controlled with water circulation		Constant-Temperature Cell Holder + NTT-2200P Constant-Temperature Water Circulator
		Thermoelectrically temperature controlled	Normal measurement	TCC-100 Thermoelectrically Temperature-Controlled Cell Holder
			For automatically measuring samples in multiple cells	CPS-100 Six-Cell Thermoelectrically Temperature-Controlled Cell Positioner
			Tm analysis or variable temperature measurement	S-1700 Thermoelectric Single Cell Holder
	Automatically supplies sample to flow cells (automatic analysis)	Requires temperature control (constant-temperature water circulation)		160C Sipper Unit + NTT-2200P
		Temperature control not necessary		160L/160T/160U Sipper Unit (Select type based on liquid volume.)
		Requires accurate control of aspiration volume.	Requires temperature control (constant-temperature water circulation)	Syringe Sipper CN + NTT-2200P (Select flow cell based on liquid volume.)
			Temperature control not necessary	Syringe Sipper N (Select flow cell based on liquid volume)
	For automating measurement of multiple samples			Sipper Unit or Syringe Sipper + ASC-5 Auto Sample Changer
Suspension Samples	Absorption measurement of suspension samples		Wavelength range: 240 nm min.	Integrating Sphere Attachment (ISR-2600, ISR-2600Plus, ISR-603)
			For measuring UV region above 190 nm	SolidSpec-3700iDUV
	Turbidity measurement		Light transmitted light turbidity measurement (commonly used measurement method)	10/50 mm Cell + Long-Path Rectangular Cell Holder (Optical path length of cell depends on test method.)
			Integrating sphere turbidity measurement	Integrating Sphere Attachment (ISR-2600, ISR-2600Plus, ISR-603)

■ Solid Samples

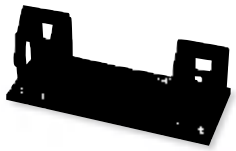
Samples	Measurement Method and Conditions			Accessories
Smooth Surface Samples*	Transmittance measurement		Less than 3 mm thick	Standard Sample Compartment + Film Holder, Cell Type Sample Holder, Glass/Film Holder for Standard Sample Compartment
			More than 3 mm thick	Integrating Sphere Attachment (ISR-2600, ISR-2600Plus, ISR-603)
			Requires a large integrating sphere (due to ISO compliance and other reasons).	Integrating Sphere Attachment, 150 mm Dia. (ISR-1503, ISR-1503F)
			Large sample size (over 100 mm square)	Large-Sample Compartment (MPC-2600A/603A or SolidSpec-3700i) Glass Sample Holder for MPC series/SolidSpec
	Reflectance measurement	Relative specular reflectance measurement	Normal measurement	Specular Reflectance Measurement Attachment (5° incident angle)
			Large sample size (over 100 mm square)	SolidSpec-3700i + Large Specular Reflectance Measurement Attachment (5° incident angle)
		Absolute specular reflectance measurement	5° incident angle measurement	Absolute Specular Reflectance Attachment (ASR-3105) (Requires a Large-Sample Compartment and BIS-3100/3700/603 Sample Base Plate Integrating Sphere Set separately).
			12°/30°/45° incident angle measurement	Absolute Specular Reflectance Attachment (ASR-3112, ASR-3130, ASR-3145) (Requires a Large-Sample Compartment, BIS-3100/3700/603 Sample Base Plate Integrating Sphere Set, and polarizer assembly separately.)
			Variable incident angle measurement	Variable Angle Measurement Unit (Requires large-sample compartment and polarizer assembly separately.)
		Relative diffuse reflectance measurement	Normal measurement	Integrating Sphere Attachment (ISR-2600, ISR-2600Plus, ISR-603)
			Requires a large integrating sphere (due to ISO compliance and other reasons).	Integrating Sphere Attachment, 150 mm Dia. (ISR-1503, ISR-1503F)
			Large sample size (over 100 mm square)	Large-Sample Compartment (MPC-2600A/603A, or SolidSpec-3700i)
Rough Surface Sample**	Transmittance measurement		Normal measurement	Integrating Sphere Attachment (ISR-2600, ISR-2600Plus, ISR-603)
			Requires a large integrating sphere (due to ISO compliance and other reasons).	Integrating Sphere Attachment, 150 mm Dia. (ISR-1503, ISR-1503F)
			Large sample size (over 100 mm square)	Large-Sample Compartment (MPC-2600A/603A, or SolidSpec-3700i)
	Reflectance measurement	Relative diffuse reflectance measurement	Normal measurement	Integrating Sphere Attachment (ISR-2600, ISR-2600Plus, ISR-603)
			Requires a large integrating sphere (due to ISO compliance and other reasons).	Integrating Sphere Attachment, 150 mm Dia. (ISR-1503, ISR-1503F)
			Large sample size (over 100 mm square)	Large-Sample Compartment (MPC-2600A/603A, or SolidSpec-3700i)
		Absolute diffuse reflectance measurement		Consult your Shimadzu representative. (Depends on the sample. A method using conversion from the mirror reflectance, for instance, is available.)
Large sample size (over 100 mm square)				Large-Sample Compartment (MPC-2600A/603A, or SolidSpec-3700i)
Small sample size (below 5 mm square)				Micro Sample Holder + Micro Beam Lens Unit

* Metals with a mirror-finished surface, mirrors, transparent acrylic and films, etc. ** Paper, cloth, plastics, semi-transparent films, etc.
For color measurement, the Color Analysis Software or LabSolutions UV-Vis Color Measurement Software is required separately. For film thickness measurement, the Film Thickness Calculation Software is required separately.

Accessories

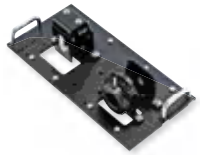
Basic Measurement

Film Holder
(P/N 204-58909)



This holder is used to hold films, filters, and other items. It is compatible with sample sizes between a minimum W16 × H32 mm and maximum W80 × H40 mm.

Rotating Film Holder
(P/N 206-28500-41)



This film holder enables in-plane rotation of samples centered on the optical axis. It is compatible with sample sizes up to 33 × 30 mm.

Multi-Cell Sample Compartment (Six Cells) (P/N 206-69160-41)

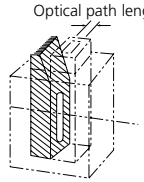
This holds up to six cells on the sample side. It is controlled automatically.

Short Optical Path, Long Optical Path, Micro-Volume Measurement

Long-Path Rectangular Cell Holder
(P/N 204-23118-01)

This holds rectangular cells with an optical path length of 10, 20, 30, 50, 70, or 100 mm.

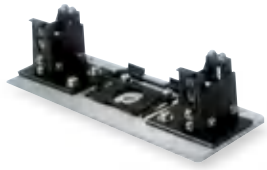
Spacers for Short-Path Cells
(P/N 204-21473-XX)



This standard cell holder is required for short optical path cells.

P/N	Available cells
-01	2 mm
-02	5 mm
-03	1 mm

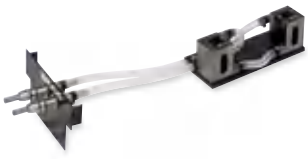
Super-Micro Cell Holder
(P/N 206-14334)



This cell holder is for supermicro cells. Volumes between 50 and 200 µL can be measured, depending on the type of black cell used.

Constant-Temperature Measurement

Constant-Temperature Cell Holder
(P/N 202-30858-44)



This cell holder controls the cell temperature by circulating constant-temperature water. The operating temperature range is 5 to 90 °C (requires a separate constant-temperature water circulator). A four-cell model is also available (P/N: 204-27206-02).

Thermoelectrically Temperature-Controlled Cell Holder (TCC-100)
(P/N 206-29510)

This device can control the temperature of cells on both the sample and reference side. The temperature-control range is 7 to 60 °C. The temperature can be adjusted only on the sample side and 6 sets are available (P/N 206-29500). The temperature-control range of 6 sets is 16 to 60 °C. A USB adapter CPS (P/N 206-25234-91) is required.

Tm Analysis System (TMSPC-8)
(P/N 206-24350)

This system is used to analyze the melting temperature (Tm) of nucleic acids (such as DNA and RNA). The temperature-control range is 0 to 110 °C. Cooling water must be circulated to cool the Peltier element.

Automatic Analysis

Sipper Units
(P/N 206-23790-XX)

This device aspirates liquid samples using a peristaltic pump. The flow cell shapes have types.

P/N	Model	Flow cell shapes
-51	160L	L model
-52	160T	Triple-pass model
-53	160C	Constant-temperature model
-54	160U	Ultra-micro volume model

Auto Sample Changer (ASC-5)
(P/N 206-23810-91)

If the ASC-5 is combined with a sipper unit or syringe sipper, it is possible to configure an automated multisample measurement system for liquid samples. A USB adapter ASC (P/N 206-25235-91) is required.

Autosampler (ASX-560/280)

If the ASX-560 is combined with a sipper unit or syringe sipper, it is possible to configure an automated multisample measurement system for liquid samples. A CETAC connection kit (P/N206-26525-91) and automatic analysis software (P/N207-25807-91) are required.

Model	Number of analytes
ASX-560	240 analytes
ASX-280	120 analytes

Integrating Sphere Units

Integrating Sphere Attachment (ISR-2600/ISR-2600Plus)
(P/N 206-28400-58/206-28410-58)

These units can be used for relative diffuse or specular reflectance measurements. The angle of incidence to the sample can be set by setting it to zero or eight degrees in combination with functionality for switching between sample and reference sides of the spectrophotometer. The measurement wavelength range is 220 to 850 nm for the ISR-2600 or 220 to 1400 nm for the ISR-2600Plus. They are compatible with reflectance samples that are W95 × H135 × T20 (for 0-deg. angle of incidence) or W70 × H70 × T12 (for 8-deg. angle of incidence).

Multipurpose Large-Sample Compartment (MPC-2600A)
(P/N 207-23520-41)

The MPC-2600A enables both reflectance and transmittance measurement of samples having a wide variety of shapes. The measurement wavelength range is 220 to 1400 nm. It is compatible with transmitted samples that are ø305 mm/50 mm thick or less or ø204 mm/300 mm thick or less, reflectance samples that are ø305 mm/50 mm thick or less.

Large Polarizer Assy / Polarizer Assys

These enable control of polarization characteristics of incident light on samples.

P/N	Type	Wavelength range
206-15694-40	Large type	250 to 2300 nm
206-13236-41	Type I	400 to 800 nm
206-13236-42	Type II	260 to 700 nm
206-13163-40	Type III	260 to 2300 nm

Powdered Sample Holder (for Integrating Sphere)
(P/N 206-89065-41)

This powdered sample holder is for installation in an integrating sphere.

Micro Sample Holder
(P/N 206-28055-41)

This holds small samples against the integrating sphere. It is compatible with sample sizes from 5 to 10 mm square and between 0.5 and 2 mm thick.

Reflectance Measurement

Absolute Reflectance Attachments

These attachments are installed in a multipurpose large-sample compartment to enable absolute specular reflectance measurements of solid samples. The measurement wavelength range is 300 to 800 nm and compatible sample size range is 20 to 150 mm square and up to 30 mm thick. A sample base plate integrating sphere set is required.

P/N	Incident angle
206-16817-58	5°
206-16100-58	12°
206-15001-58	30°
206-15002-58	45°

Variable Angle Measurement Unit for MPC-2600A (P/N 207-23490-41)

This device enables absolute reflectance measurements of solid samples, with the incident and reflection angles set to any angle. Measurement wavelength range is 250 to 1400 nm. It is compatible with sample sizes from 20 to 70 mm square and between 2 and 15 mm thick. The incident angle can be set between 5 and 70 degrees.

Specular Reflectance Measurement Attachment (5° Incident Angle)
(P/N 206-14046-58)

This device enables specular reflectance measurements. The angle of incidence to the sample is 5 degrees. It is compatible with sample sizes from 7 mm in diameter up to 160 × 100 mm and up to 15 mm thick.

ANALYTICAL INTELLIGENCE

-Automated support functions utilizing digital technology, such as M2M, IoT, and Artificial Intelligence (AI), that enable higher productivity and maximum reliability.
-Allows a system to monitor and diagnose itself, handle any issues during data acquisition without user input, and automatically behave as if it were operated by an expert.
-Supports the acquisition of high quality, reproducible data regardless of an operator's skill level for both routine and demanding applications.

SHIMADZU

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