

# SolidSpec-3700 SolidSpec-3700DUV

Shimadzu  
UV-VIS-NIR Spectrophotometer





UV-VIS-NIR Spectrophotometer

# SolidSpec-3700

Standard model

# SolidSpec-3700DUV

Enhanced model for deep UV Measurement to 165 nm<sup>(note)</sup>

Shimadzu

UV-VIS-NIR Spectrophotometer

Shimadzu's Advanced Technology and High Reliability Lead to the Solutions for Optical, Semiconductor and FPD Fields.

## High Sensitivity

The SolidSpec-3700 and 3700DUV are the FIRST UV-VIS-NIR SPECTROPHOTOMETERS with THREE DETECTORS : a photomultiplier tube (PMT) detector for the ultraviolet and visible region, and InGaAs and PbS detectors for the near-infrared region. The use of the InGaAs and PbS detectors makes the sensitivity in the near-infrared region significantly high.

## Deep UV Measurement

The SolidSpec-3700DUV has the capability to measure the deep ultraviolet region down to 165nm<sup>(note)</sup> (or to 175nm with an integrating sphere) by purging both the optical and the sample compartment with nitrogen gas.

## Large Sample Compartment

The large sample compartment (900W x 700D x 350H mm) allows large samples to be measured without destroying the sample. The vertical optical path makes it possible to measure large samples. The whole sample area 12 inch diameter or 310 x 310 mm is measurable by mounting the automatic X-Y stage (option).

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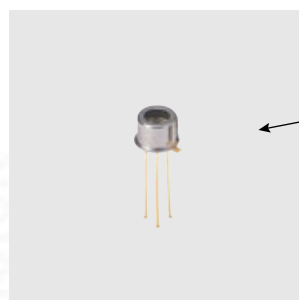
P 14 - Workstation

# High Sensitivity (SolidSpec-3700/3700DUV)

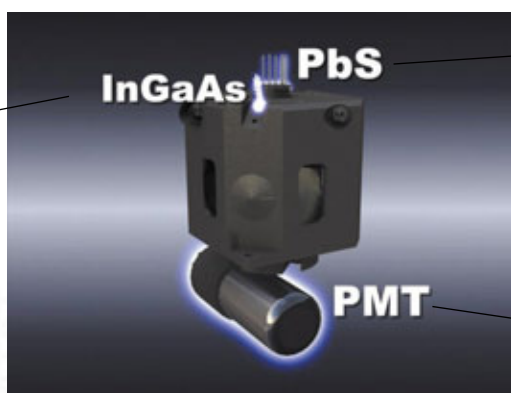
High accuracy for transmittance and reflectance is required for the measurement of optical parts. The SolidSpec-3700/3700DUV have three detectors which cover the range from ultraviolet to near-infrared. The sensitivity in the near-infrared region is

significantly enhanced by using both InGaAs and cooled PbS detectors. Highly accurate and highly sensitive spectra are obtainable from ultraviolet to near-infrared.

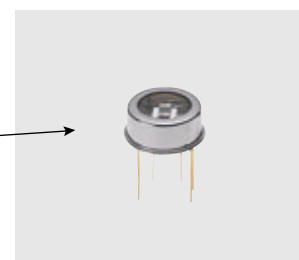
## Three Detectors



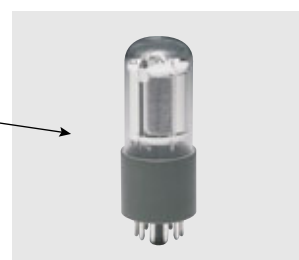
InGaAs detector



Three detectors attached to the integrating sphere

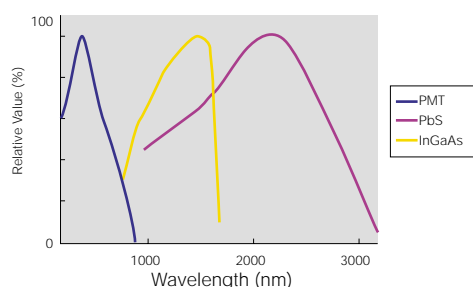


PbS detector



PMT detector

Sensitivity Characteristic



Conventional spectrophotometers have used a photomultiplier tube detector for the ultraviolet and visible region and a PbS detector for the near-infrared region. However, neither detector has much sensitivity near the detector switchover, preventing high sensitivity measurement in this range. The SolidSpec-3700/3700DUV make it possible to take high sensitivity measurements in the switchover range by using an InGaAs detector as shown in the figure on the left.

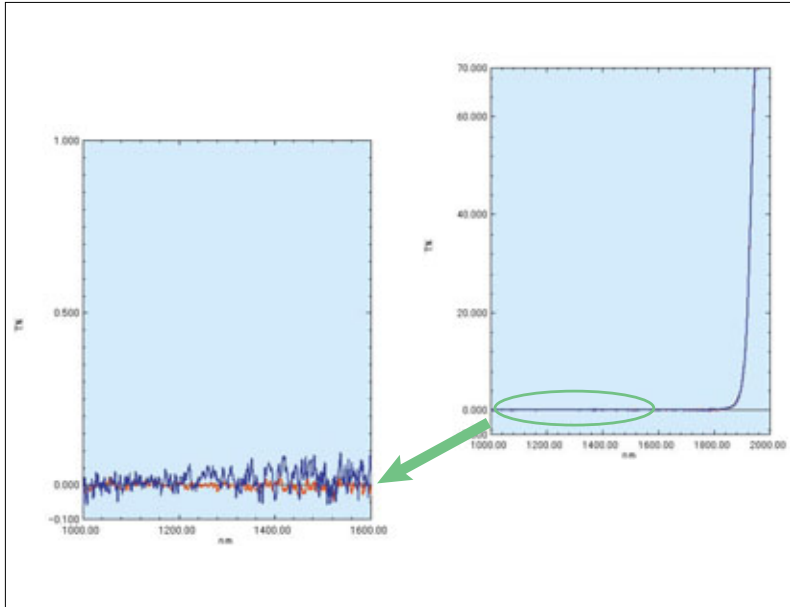
## Relationship between Detectors and Measurable Range

	165nm	380nm	780nm	3300nm
	UV	Visible	NIR	
PMT	165~1000nm			
InGaAs			700~1800nm	
PbS				1600~3300nm

The photomultiplier tube detector can be switched to the InGaAs detector in the range from 700nm to 1000nm (the default switching wavelength is 870nm). The InGaAs detector can be switched to a PbS detector in the range from 1600nm to 1800nm (the default switching wavelength is 1650nm).



## Measurement Comparison between Two Detectors and Three Detectors

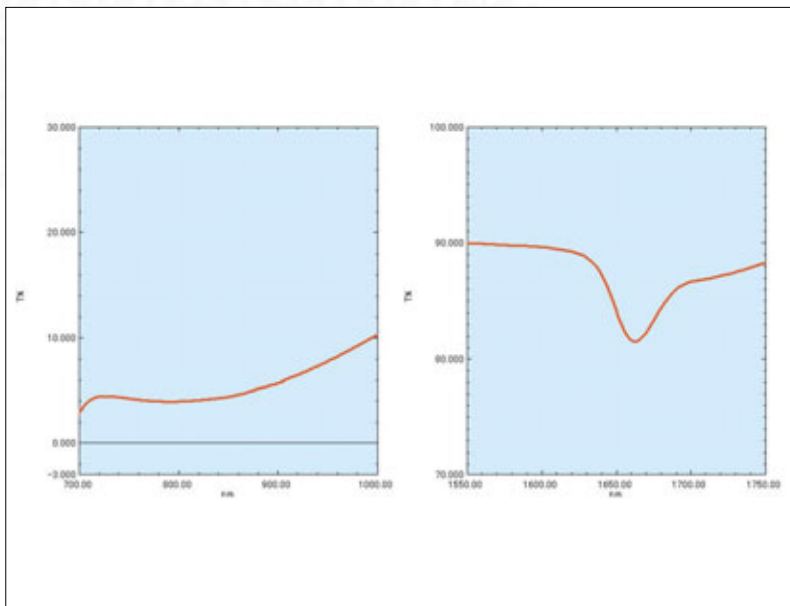


— : SolidSpec-3700 (InGaAs detector)  
 — : Previous model (PbS detector)

By using an InGaAs detector in combination with a photomultiplier tube (PMT) and a cooled PbS detector, the noise in the InGaAs detector range (900nm to 1600nm) is significantly reduced compared with that measured on the conventional two detector (PMT and PbS) spectrophotometer.

The transmittance spectra of sharp cut filter measured on an InGaAs detector and a PbS detector (conventional spectrophotometer) are shown in the figure on the left. Low noise around 0% transmittance is a very powerful tool to measure low reflection samples such as anti-reflective coatings or films used in the optical communication field.

## High Accuracy Measurement with Minimized Detector Switchover Noise and Bump



The transmission spectra of color filter and polyester film are shown in the left and right figures, respectively.

Noise or bump caused by the detector switchover range at 870nm and 1650nm is hardly observed.

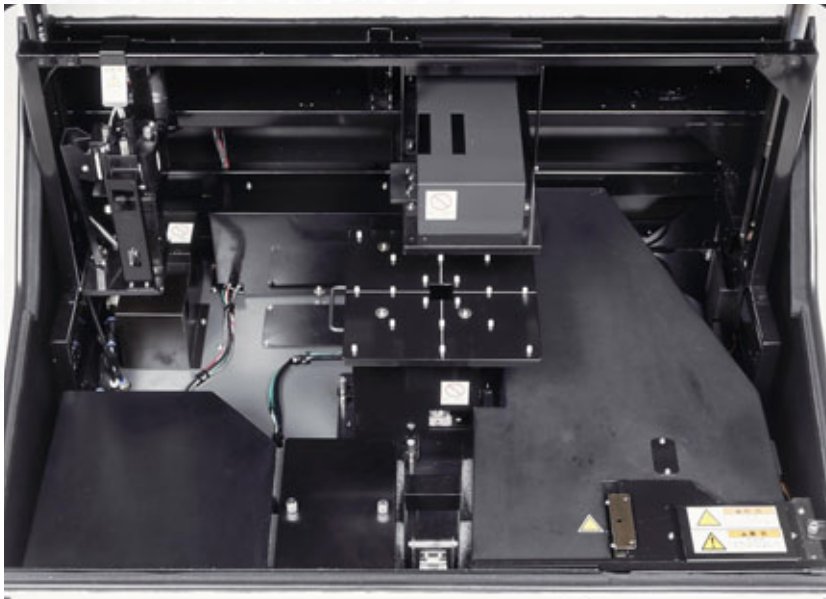
Noise and bump caused by detector switchover are minimized to assure accurate measurement.

# Deep UV Measurement (SolidSpec-3700DUV)

The development of precise laser machining using an ultraviolet laser such as an ArF excimer laser enhances the requirement for transmittance or reflectance measurements of optical parts in the deep ultraviolet region. The SolidSpec-3700DUV<sup>(note1)</sup> enables

measurement in the range of 175nm to 2600nm<sup>(note2)</sup> with an integrating sphere and the range of 165nm to 3300nm<sup>(note3)</sup> by mounting the optional Direct Detection Unit DUV. With this additional unit, the wide range from deep ultraviolet to near-infrared is now measurable.

## Nitrogen Gas Purge



Oxygen molecules in the atmosphere absorb ultraviolet light under 190nm. Nitrogen gas purging for both the optical and the sample compartment is required to remove the interfering oxygen molecules. Since the SolidSpec-3700DUV has purge inlets for each compartment, efficient nitrogen gas purge is possible so that the time required for purging after sample replacement is reduced, and high sensitivity with lower stray light in the deep UV region is achieved.

## Integrating Sphere and Photomultiplier for the Deep Ultraviolet Region



Integrating Sphere for Deep Ultraviolet



Photomultiplier for Deep Ultraviolet

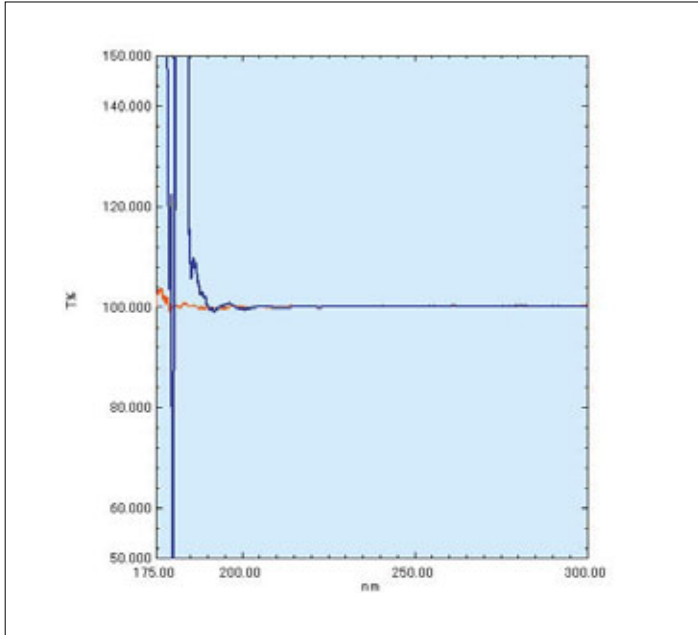
Materials which do not absorb deep ultraviolet light are required to be used as the window material for the detector and the material for the inside of the integrating sphere to enable performance in the deep ultraviolet region. The SolidSpec-3700DUV uses a PMT detector with fused silica as the window material and an integrating sphere with resin that has highly reflective characteristics in the deep ultraviolet region as the inside material.

Note1) In order to measure the range below 190nm with the SolidSpec-3700DUV, nitrogen gas purge is required to remove interference from oxygen molecules inside the SolidSpec-3700DUV.

Note2) The measurable range for SolidSpec-3700 is 240nm to 2600nm.

Note3) The measurable range for SolidSpec-3700 with the optional Direct Detection Unit is 190nm to 3300nm.

## Integrating Sphere for Deep Ultraviolet Measurement

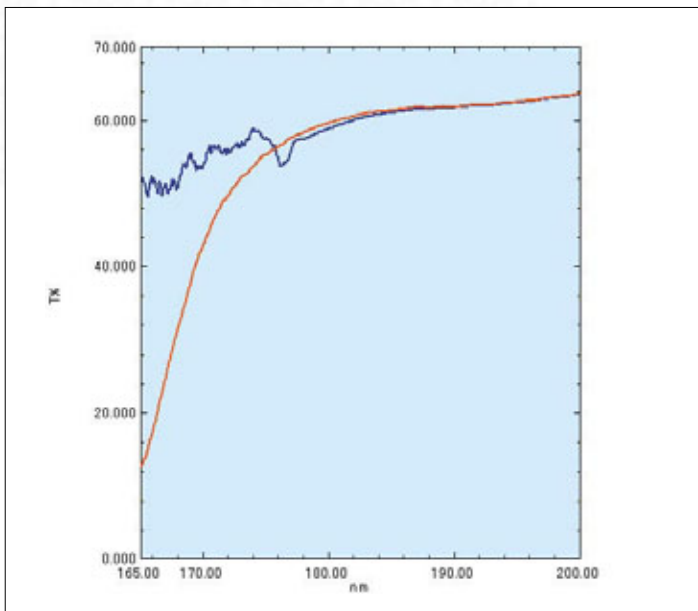


Spectra with noise under 190nm are obtainable, as compared with conventional spectrophotometers, which can be a powerful feature for the measurement of materials used for ArF laser in the semiconductor field.

The 100 % baseline spectra measured on the SolidSpec-3700DUV with an integrating sphere for the deep ultraviolet measurement and the SolidSpec-3700 with a normal integrating sphere are shown in the left figure.

- : SolidSpec-3700DUV with an integrating sphere for the deep ultraviolet measurement
- : SolidSpec-3700 with a normal integrating sphere

## Application for Deep Ultraviolet Region



In order to perform high-accuracy measurements in the deep UV region, a sufficient quantity of light and significant low stray light are required. The transmission spectrum of a silica plate measured with the Direct Detection Unit DDU-DUV(option) is shown in the left figure. Spectra with significantly lower noise are obtainable in the ultraviolet region.

Transmission Spectra of Silica Plate

- : Transmission spectrum of Silica plate measured with nitrogen purge
- : Transmission spectrum of Silica plate measured without nitrogen purge

# Large sample Compartment (SolidSpec-3700/3700DUV)

The SolidSpec-3700 & 3700DUV have large sample compartments which allow large samples to be measured without sample destruction. Their internal dimensions are 900W x 700D x 350H mm. A sample maximum of 700W x 560D x 40H mm can be set in the sample compartment and an entire sample area of 12

inches or 310 x 310 mm is measurable by mounting the Automatic X-Y stage (option). The vertical optical path makes it possible to perform transmission or reflectance measurements of large samples.

## Large Sample Compartment



Large Sample Compartment  
A sample of 700W x 560D mm is set in the sample compartment.

## Three Dimensional Optical Path

The three dimensional optical path makes it possible to measure large samples without destroying the sample.



Three Dimensional Optical Path

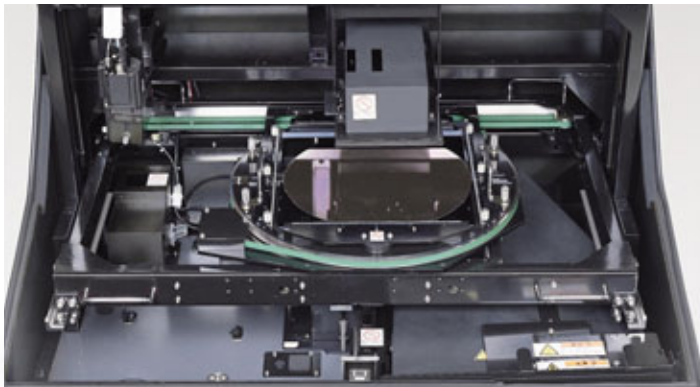


A wide variety of accessories, such as absolute specular reflectance attachments and relative specular reflectance attachments created for the SolidSpec-3700/3700DUV; expand the application range. Automatic measurements can be performed with the optional Automatic X-Y Stage by inputting the intervals and the rotation angles for the sample.

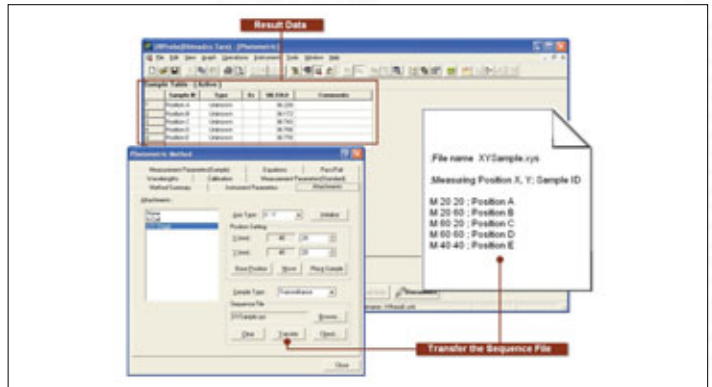
## Automatic Measurement

### Automatic X-Y Stage (Option)

The Automatic X-Y Stage developed for the SolidSpec-3700/3700DUV enables automatic measurements for the points specified in advance while maintaining the nitrogen gas purge.



12 inch Silicon Wafer on Automatic X-Y Stage



Input of Intervals and Rotation Angles

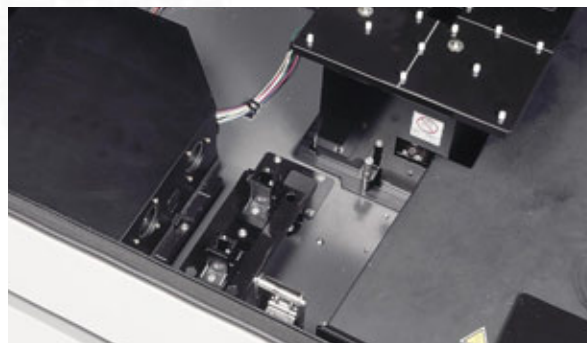
## Direct Measurement of Liquid Samples and Solid Samples without Integrating Sphere

### Direct Detection Unit (Option)

The SolidSpec-3700/3700DUV measure samples with an integrating sphere as the standard detection system. However, some samples require measurement without using an integrating sphere. The Direct Detection Unit was created for just such instances. By mounting the Direct Detection Unit (DDU-DUV) in the SolidSpec-3700DUV, measurements down to 165nm<sup>(note1)</sup> are possible. Measurements with the Direct Detection Unit can be performed simply by switching a mirror.



Measurement of Film Sample with Direct Detection Unit



Measurement of Liquid Sample with Direct Detection Unit

Note1) In order to measure below 190nm with SolidSpec-3700DUV, nitrogen gas purging is required to remove interfering oxygen molecules inside of the SolidSpec-3700DUV.

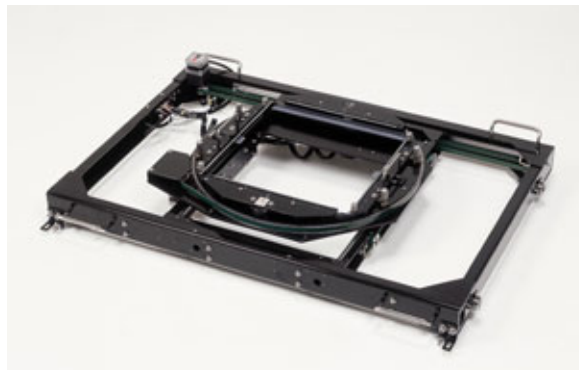
Note2) The measurable range for the SolidSpec-3700 with the optional Direct Detection Unit is 190nm to 3300nm.

# Accessories

## **Automatic X-Y Stage** (206-20810-39)

The Automatic X-Y Stage enables automatic measurements for the points specified in advance and is a powerful accessory for high-throughput measurements.

- Maximum sample size :  
310mm diameter or 310 x 310mm, 40mm thickness



## **Direct Detection Unit**

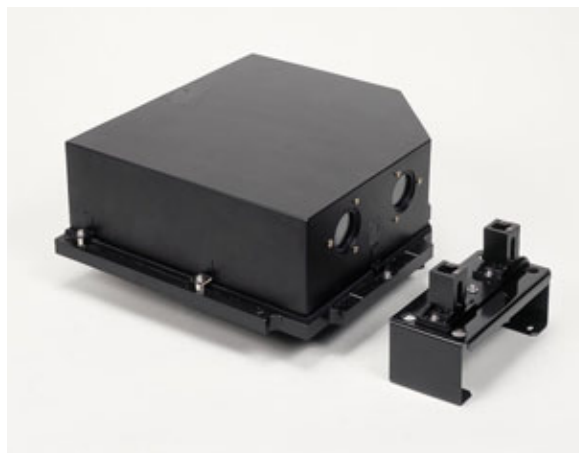
### **DDU** (206-20264-91)

## **Direct Detection Unit**

### **DDU-DUV** (206-20264-92)

The same sample compartment as a conventional UV-VIS spectrophotometer can be added to the SolidSpec-3700/3700DUV by mounting the Direct Detection Unit DDU or DDU-DUV.

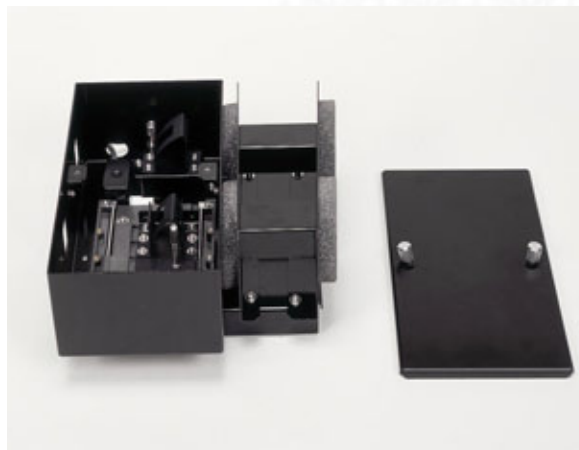
- Measurement wavelength range :  
DDU 190~3300nm (when mounted in SolidSpec-3700)  
DDU-DUV 165~3300nm (when mounted in SolidSpec-3700DUV)



## **Purge Box** (206-21788-91)

The Purge Box is used with the Direct Detection Unit DDU-DUV, allowing the inside to be purged. The Purge Box has a film holder and a six-cell holder and allows the cell positions to be moved without opening the cover of the SolidSpec-3700/3700DUV.

- Maximum sample size :  
60 x 60mm, 20mm thickness



## Absolute Specular Reflectance Attachments

### Absolute Specular Reflectance Attachment, 5 degrees

**ASR-3105** (206-16817)

### Absolute Specular Reflectance Attachment, 12 degrees

**ASR-3112** (206-16100)

### Absolute Specular Reflectance Attachment, 30 degrees

**ASR-3130** (206-15001)

### Absolute Specular Reflectance Attachment, 45 degrees

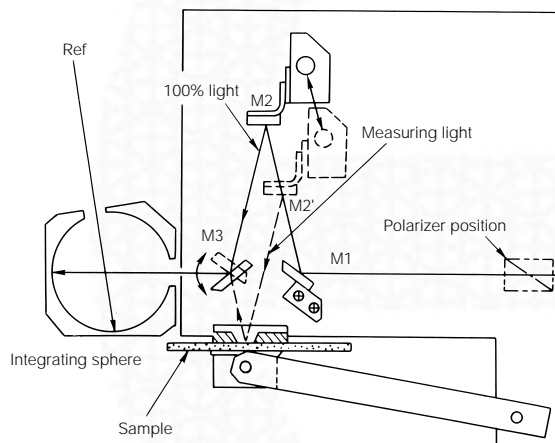
**ASR-3145** (206-15002)

These attachments are used for the measurement of solid samples such as mirrors etc and require the BIS-3700 (Cat. No. 206-20880-91) or BIS-3700DUV (Cat. No. 206-20880-92). Since the polarization characteristics are more pronounced at higher angles of incidence (30 or 45 degrees), the optional Polarizer attachment is required to obtain accurate reflectance measurements.

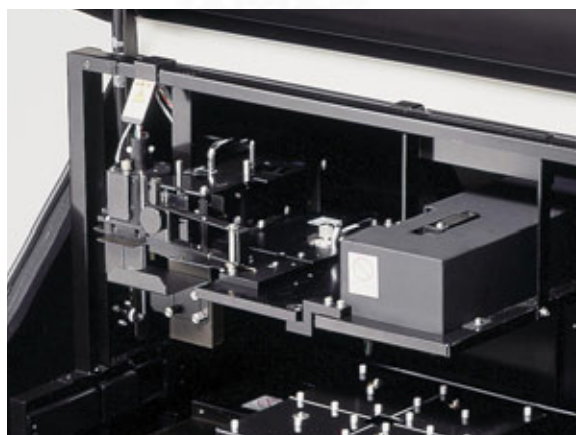
● <b>Wavelength Range</b>	5 degrees	: 300~2400nm
	12 degrees	: 300~2500nm
	30 and 45 degrees	: 300~2300nm

- V-N method : Optical path is easily switched between 100% measurement setting and sample measurement.
- Approximate sample size : 25 to 200(100)<sup>(note)</sup> mm dia, or 20 to 150 (100) mm square, up to 30 mm thick.

Note ) The maximum sample size for SolidSpec-3700DUV is shown in the parenthesis.



Structure of Absolute Specular Reflectance Attachment



ASR-3112 mounted on BIS-3700

### Sample Base Plate Integrating Sphere Set

**BIS-3700** (206-20880-91)

### Sample Base Plate Integrating Sphere Set

**BIS-3700DUV** (206-20880-92)

BIS-3700/3700DUV are the integrating spheres with base plates. These are needed to install an Absolute Specular Reflectance Attachment in the SolidSpec-3700. The measurement wavelength ranges for the BIS-3700 and BIS-3700DUV are 240 nm to 2600 nm and 175 nm to 2600 nm, respectively.





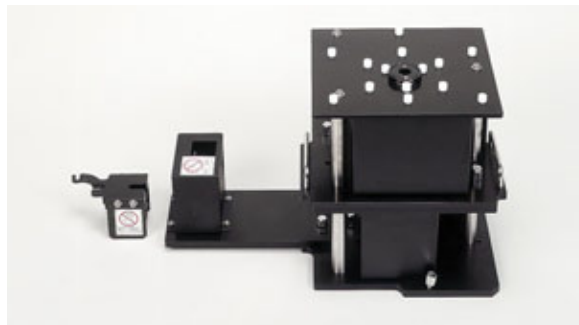
# Accessories

## Large Specular Reflectance Attachment (5 degrees incident angle)

(206-20570-91)

The Large Specular Reflectance Attachment is needed for the relative specular reflectance measurements. This accessory is mounted in the main body of the SolidSpec-3700/3700DUV and enables reflectance measurements even when keeping the samples horizontal. The Direct Detection Unit DDU or DDU-DUV is not required for this accessory.

- Applicable sample size: maximum 470W x 560D x 40H (mm)



## Specular Reflectance Attachment (5 degrees incident angle)

(206-14046)

The Specular Reflectance Attachment is used with the Direct Detection Unit (DDU or DDU-DUV). This accessory enables relative specular reflectance measurements without using an integrating sphere. The Direct Detection Unit DDU (Cat. No. 206-20264-91) or DDU-DUV (Cat. No. 206-20264-92) is required.

- Applicable sample size: maximum 260W x 120D x 250H (mm), 8kg



## Large Polarizer Set, Polarizer Type 1, Type 2, Type 3, Polarizer Adaptor Set

Polarizers are needed to obtain highly precise absolute reflectance at large incident angles without affecting the polarization characteristics. The Polarizer Adaptor set (Cat. No. 206-15693) is required for the Polarizer Type I, Type II and Type III.

	Cat. No.	Effective Diameter	Wavelength Range
Large Polarizer Set	206-15694	20mm	250~2500nm
Polarizer Type I	206-13236-01	18mm	400~800nm
Polarizer Type II	206-13236-02	17mm	260~700nm
Polarizer Type III	206-13163	11mm	260~2500nm





## Film Holder (204-58909)

The Film Holder is used to measure thin samples such as films and requires the Direct Detection Unit DDU (Cat. No. 206-20264-91) or DDU-DUV (Cat. No. 206-20264-92).

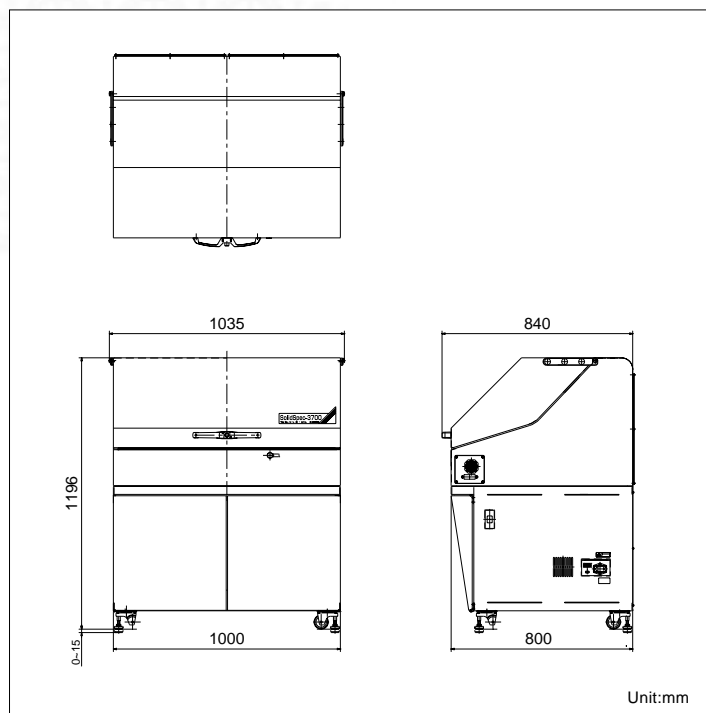
- Applicable sample size: minimum 16W x 32H (mm)  
maximum 80W x 40H x 20t (mm)



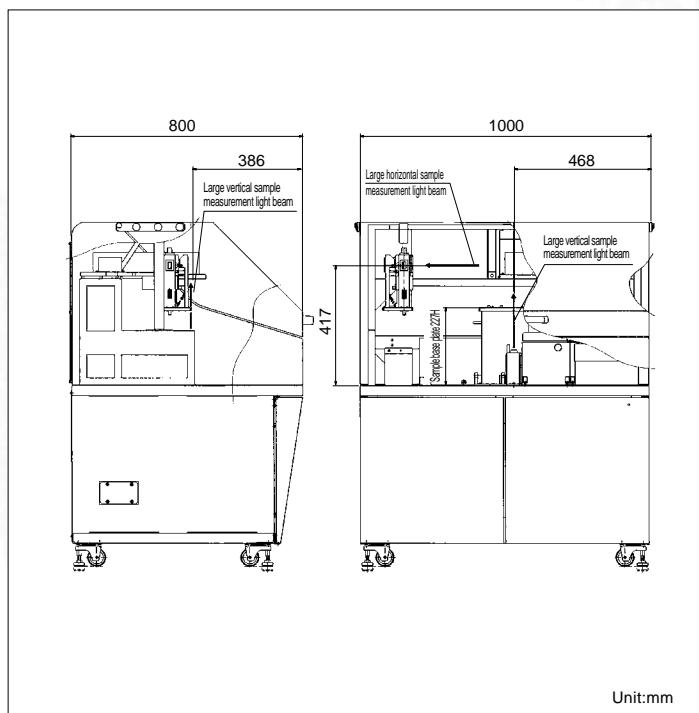
## 10 mm Square Cell Holder for Integrating Sphere (206-22339-92)

The 10mm Square Cell Holder for liquid sample measurement is mounted on the standard integrating sphere built into the SolidSpec-3700/3700DUV.

### Dimensions



### Inside dimensions



# UVProbe (SolidSpec-3700/3700DUV)

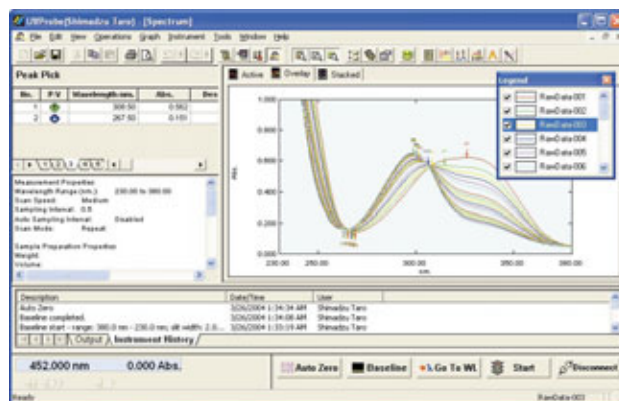
## All-in-one Software

UVProbe includes four functions:

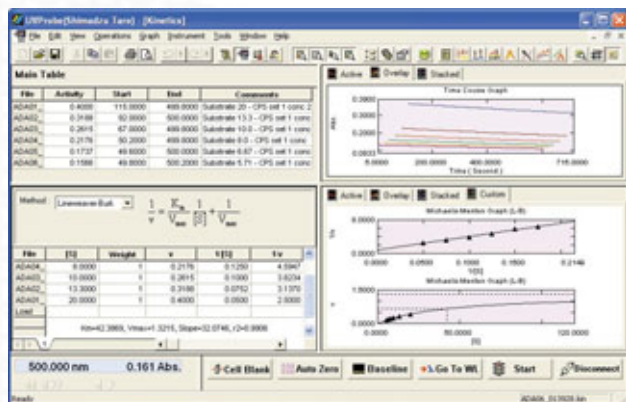
- Spectrum
- Photometric (Quantitation)
- Kinetics
- Report Generator

Each function can be easily operated with its dedicated screen. Included as standard are a wide variety of data processing functions such as peak/valley detection, area calculation, and others. Security features by which each user is limited to the use of specific functions, and an audit trail for the instrument and the data are all standard as well.

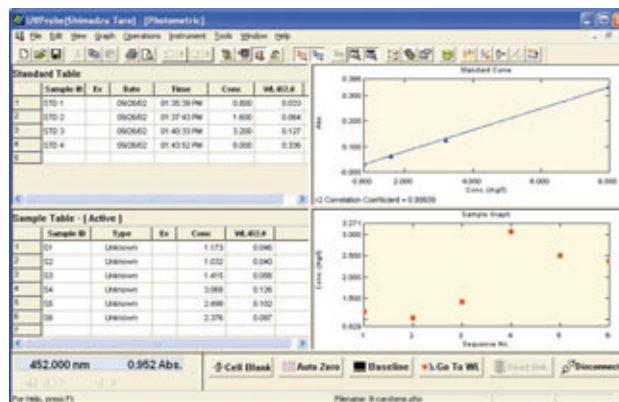
## Spectrum



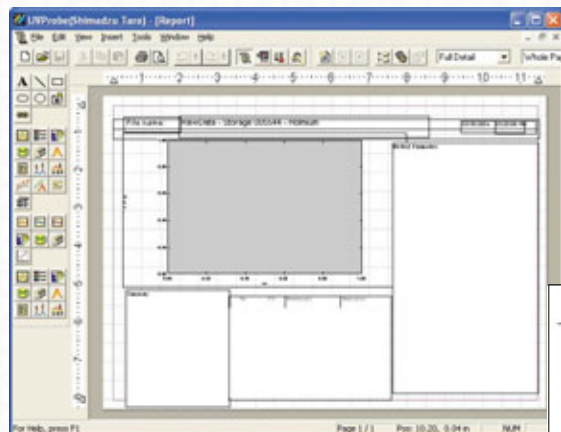
## Kinetics



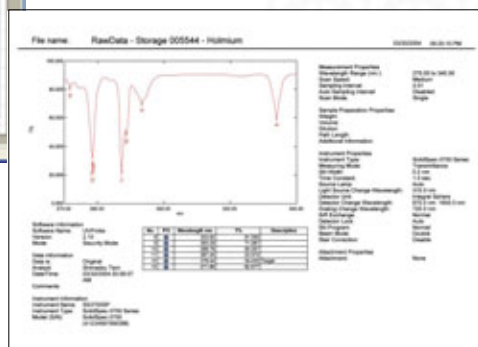
## Photometric



## Report Generator

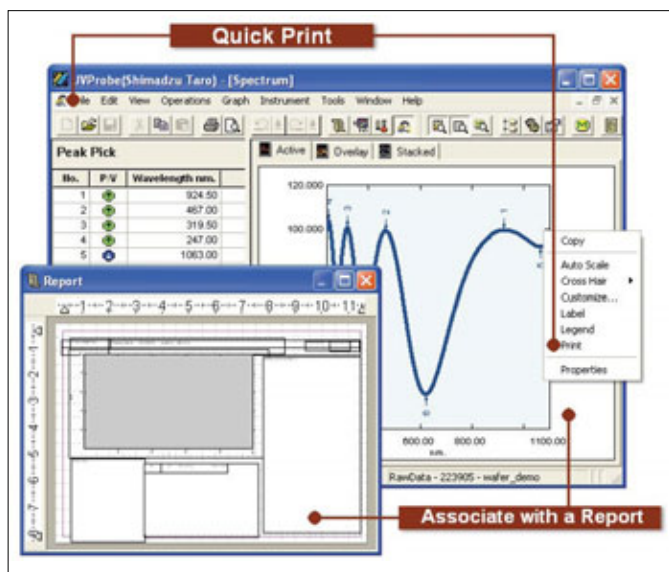


The report generator gives you the freedom to arrange graphs, tables, etc. to suit your needs. The thickness and color of graph lines and font size can be specified. Pasting labels on graphs and editing text is as easy as can be, allowing you to effectively print comments along with the analysis results.



## Quick Print

Quick Print allows you to print data directly from the Spectrum, the Kinetics and the Photometric modules without moving to the Report Generator. Once the report template is stored as the report file, the report can be printed simply by utilizing the 4th step, without steps 1~3.

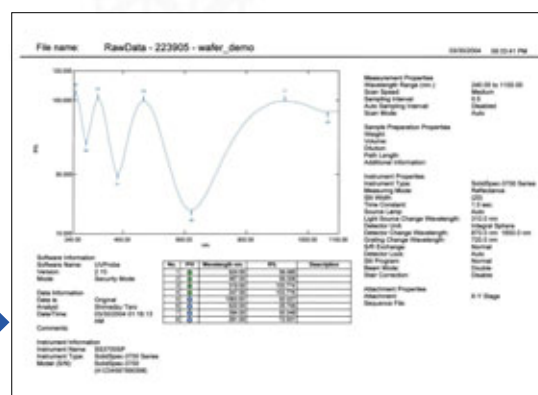


**Step 1** – Make the report template

**Step 2** – Assign the data to the report template

**Step 3** – Check the report to be printed

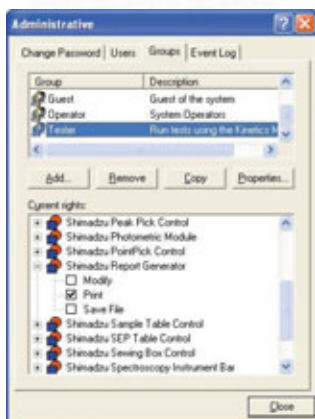
**Step 4** – Print the report by Quick Print



## Reliability and Management of Data

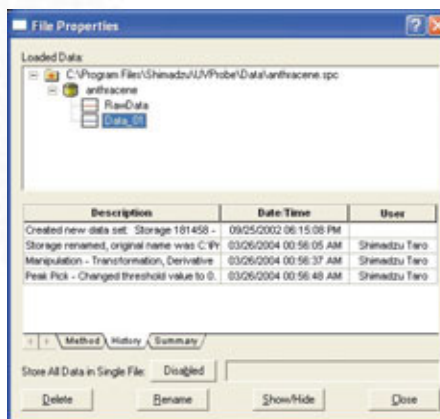
As represented by ISO9001, the reliability and management of data have been increasingly required. UVProbe has security functions in which operations are limited for the individual user, a data audit trail function and an instrument audit trail function. This ensures the reliability of data.

### Security



UVProbe enables software operations to be limited for the individual user. User management can be done for user groups as well.

### Audit Trail



For example, when data processing is performed, the resultant data is stored together in the same file with the original data, which remains intact. The audit trail function tracks the instrument's history.



# UVProbe (SolidSpec-3700/3700DUV)

## Pass or Fail Judgment Functions

Formulas to judge pass/fail for measurement results within the Measurement Method in the Photometric Module can be created. Once the formula for the measurement values or the calculation results is created, the judgments are shown in the sample table. Complicated formulas with multiple wavelengths are also available.

### Creation of Formula

Formulas for measurement result values or calculation results can be created. For example, this formula expresses that if the transmittance at 600nm (WL600.0) is higher than 60% and less than 64%, the Pass criteria is met. If not, a result of Fail is given.

### Operators

The operators which can be used in the formula are given here.

### Stored Formulas

The stored formulas are shown here. Multiple formulas can be stored.

## Measurement

Sample Table - [ Active ]

	Sample ID	Type	Ex	WL460.0	WL600.0	PF_460	PF_600	Result
1	Filter_1	Unknown		57.669	62.621	Pass	Pass	Pass
2	Filter_2	Unknown		56.184	61.475	Fail	Pass	Fail
3	Filter_3	Unknown		59.351	64.758	Pass	Fail	Fail
4	Filter_4	Unknown		60.579	65.907	Fail	Fail	Fail
5	Filter_5	Unknown		57.100	62.468	Pass	Pass	Pass
6	Filter_6	Unknown		58.841	63.947	Pass		
7	Filter_7	Unknown		57.901	63.139	Pass		
8	Filter_8	Unknown		56.076	61.423	Fail		
9								

The judgments given by the formula are shown with the measurement values.

A brief explanation for the column can be shown.

Performs logical operation to determine if a sample is within a specified range or above or below a specified value.  
Formula: (WL600.0>60)&(WL600.0<64)

### Open/Save for Measurement methods

UVProbe can open and save all of the created measurement methods as individual files. Once the measurement method, which also includes the formula, is saved, measurements under the same conditions can be repeated at any time.



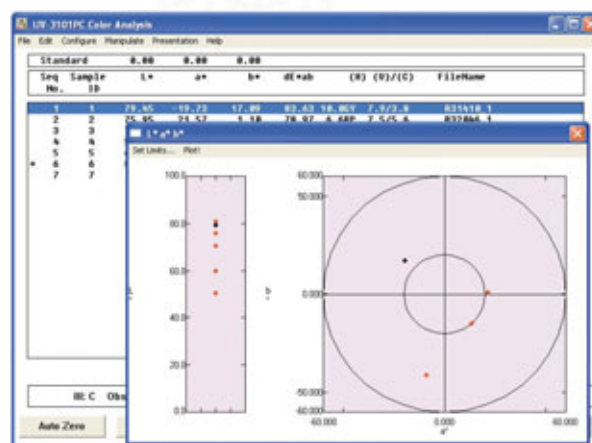
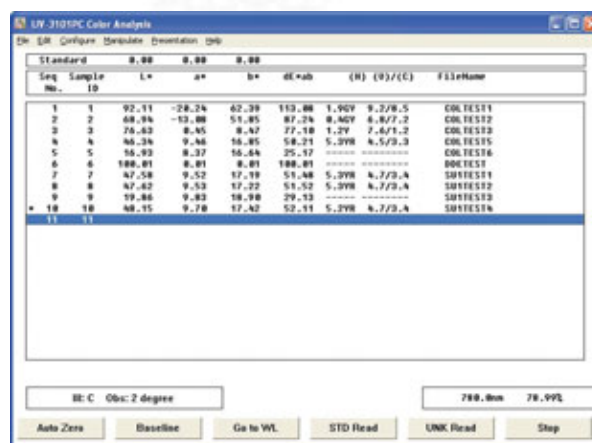
# Optional Software (SolidSpec-3700/3700DUV)

## Color Measurement Software (206-67449)

This software calculates color indices from the spectra given by the spectrophotometer.

- Presents indices of XYZ, Lab(Hunter), L\*a\*b\*, L\*u\*v\*, Munsell, whiteness, yellowness, metamerism, and many others.
- Recalculates any results with different parameters and conditions.
- Chromaticity diagram and magnified color difference diagram may be graphically displayed.
- Permits computation using user-defined illuminants, besides the standard ones. The user-defined illuminants may be stored as files to be recalled at any time.
- Correction using the standard white plate ensures high accuracy in color computation. The set standard values may be stored as files to be recalled at any time.
- Calculates color differences using the arbitrarily selected standard samples.
- Available convenient functions include thickness correction, smoothing, averaging, and standard deviation calculation.
- Up to 100 data may be displayed together.

(Note) This software runs on Windows 2000/XP.



## Film Thickness Measurement Software (206-66877)

This software provides calculation of film thickness from the peak positions of the interference pattern.

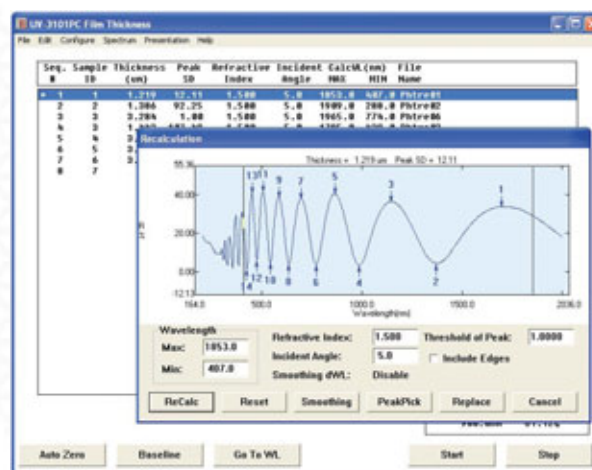
- Measurable thickness range is expressed by the next equation, though it somewhat differs with the type of samples

$$\frac{\lambda_e}{n} < d < \frac{50\lambda_s}{n}$$

$\lambda_e$  : Shortest measured wavelength  
 $\lambda_s$  : Longest measured wavelength  
 $n$  : Refractive index of sample

- Automatically detects valleys and peaks of interference spectrum.
- Calculates film thickness from the wavelengths of all the peaks and valleys within the specified wavelength range.
- Wavelength range may be selected watching the interference pattern.

(Note) This software runs on Windows 2000/XP.



# Specifications

**SolidSpec-3700 Standard Model : P/N 206-57000-31, -32, -38**

**SolidSpec-3700DUV Deep UV Model : P/N 206-20600-31, -32, -38**

**(-31:100V, -32:120V, -38:220/230/240V CE model)**

## Software

Data Acquisition Modes	Spectrum, Kinetics and Photometric
General	Multitasking (Possible to execute data processing while measurement is being executed.)
	Customizable measurement screen layout (wavelengths, data display font and font size, colors, displayed number of rows)
	GLP/GMP compliant (security, history), Real time concentration display
Spectrum Mode	Comparison of multiple spectra/relative processing <sup>(note)</sup>
	Save all processed data with original data set including a history of all manipulations
	Spectrum enlargement/shrinking, auto scale and Undo/Redo of these operations. Annotation on spectrum screen.
Data Processing in Spectrum Mode	Normalization, Point pick, Peak/Valley detection, Area calculation, Transformation: 1st-4th derivatives, Smoothing, Reciprocal, Square root, Natural log, Logarithm power, Abs to %T conversion, Exponential conversion, Kubelka-Munk conversion, Ensemble averaging, Interpolation, data set and constants arithmetic (between spectra, between spectra and constants)
	Photometric (Quantitation) Mode
	Single wavelength, Multi wavelength (includes 1, 2 or 3 wavelengths), Spectrum quantitation (peak, maximum minimum, area, etc. for specified wavelength ranges)
Photometric (Quantitation) Mode	Multi-point, Single point, K-factor calibration curves (1st, 2nd, 3rd order function fits, pass-through-zero specification)
	Photometric processing with user-defined functions (+, -, x, /, Log, Exp, etc. functions, including factors)
	Weight correction, Dilution factor correction and other corrections using factors
Kinetics (Time Course) Mode	Averaging of repeat measurement data, Simultaneous display of standard table, unknown table and calibration curves, Display of Pass/Fail indications
	Comparison/relative data processing of multiple time course data <sup>(note)</sup>
	Single or double wavelength measurement (difference or ratio)
Report Generator	Unitary management of sample information including original data, sample weight and dilution factors, etc.
	Time course spectrum data processing (same as in data processing)
	Preview and print function for customized formats, Layout and editing of templates, Quick printing using report template
Report Generator	Multi-page printout support. Insert data, time, text and drawing objects including lines, circles and rectangles
	Insert spectrum and quantitation data, method and history
	Headers and footers easily inserted, Specify graph line thickness (as in all modules), font style and size

Note) Depends on PC environment (memory, etc.), As a guideline, from 20-30 spectrum data sets.

A PC (and a power supply for the PC) is required separately.

## PC Requirements

Type	Desktop and Notebook
Operating System	Windows 2000/XP
CPU	Pentium 200MHz and later
Video	SVGA video monitor, 1024 x 768 dot screen resolution
RAM	128MB and more
HDD	50MB and more for free space

Even with the above configuration, UVProbe operating performance cannot be guaranteed, depending on Windows settings, hardware state, etc.  
Use Shimadzu recommended equipment, if possible.

### Note

When the deep UV region is measured on the SolidSpec-3700DUV, nitrogen gas purge is needed to remove the inside oxygen gas. The flow rate of nitrogen gas is 80L/min to 100L/min (50L/min when using the Direct Detection Unit DDU-DUV). Since a large amount of high-purity nitrogen gas is required, supplying liquid nitrogen is recommended. The recommended specifications of nitrogen gas are purity over 99.999% and supply pressure of around 0.2MPa. It takes approximately one hour (30 minutes when using the Direct Detection Unit) to purge the inside of the SolidSpec-3700DUV before measuring samples. The installation site of the SolidSpec-3700DUV must be ventilated to keep the oxygen concentration over 18%. It is recommended that the SolidSpec-3700DUV be installed in a room which has an exhaust system such as a draft chamber (around 20m<sup>3</sup>/min) or ventilation hood.

## Hardware

Wavelength range	· Solidspec-3700 Standard model	
	240nm~2600nm, 190nm~3300nm (when using Direct Detection Unit DDU)	
	· Solidspec-3700DUV Deep UV model	
	175nm~2600nm, 165nm~3300nm (when using Direct Detection Unit DDU-DUV)	
Spectral bandwidth	8 steps in ultraviolet and visible region : 0.1, 0.2, 0.5, 1, 2, 3, 5, 8nm	
	10 steps in near-infrared region : 0.2, 0.5, 1, 2, 3, 5, 8, 12, 20, 32nm	
Resolution <sup>(note1)</sup>	0.1nm	
Display of wavelength	0.01nm display	
Wavelength accuracy <sup>(note1)</sup>	±0.2nm in ultraviolet and visible region      ±0.8nm in near-infrared region	
Wavelength repeatability <sup>(note1)</sup>	within ±0.08nm in ultraviolet and visible region      within ±0.32nm in near-infrared region	
Wavelength scanning speed	Wavelength setting by	
	About 18,000nm/min in ultraviolet and visible region      About 70,000nm/min in near-infrared region	
	Wavelength scanning by	
	Maximum 4,500nm/min for ultraviolet and visible region, Maximum about 9,000nm/min for near-infrared PMT and InGaAs,	
	Maximum about 4,000nm/min for near-infrared PbS	
Switching of the light sources	The light sources are switched automatically in conjunction with wavelength scanning.	
	The wavelength at which the light source is switched in the range of 282 nm to 393 nm in 0.1nm increments.	
Stray light <sup>(note1)</sup>	Less than 0.00008% (220nm, NaI)	
	Less than 0.00005% (340nm, NaNO <sub>2</sub> )	
	Less than 0.0005% (1420nm, H <sub>2</sub> O)	
	Less than 0.005% (2365nm, CHCl <sub>3</sub> )	
Photometric system	Double beam, direct ratio measuring system	
Photometric range	-6 to 6Abs	
Photometric accuracy	±0.003Abs(1Abs), ±0.002Abs(0.5Abs) determined with NIST 930D standard filter	
Photometric repeatability	0.001Abs (0~0.5Abs), 0.002Abs (0.5~1Abs) determined under conditions of 1 second accumulation and maximum deviation for five times measurements	
Noise	Under 0.0002Abs (500nm, SBW 8nm), Under 0.00005Abs (1500nm, SBW 8nm) determined under conditions of RMS value at 0Abs and 1 second response	
	When using the Direct Detection Unit DDU/DDU-DUV, under 0.00005Abs (500nm, SBW 2nm), under 0.00008Abs (900nm, SBW 2nm), under 0.00003Abs (1500nm, SBW 2nm) determined under conditions of RMS value at 0Abs and 1 second response.	
Baseline flatness	±0.003Abs (240~350nm, SBW 8nm)	
	±0.002Abs (350~1600nm, Visible region : SBW 8nm, Near-infrared region : SBW 20nm)	
	±0.004Abs (1600~2600nm, SBW 20nm)	
	±0.001Abs (200~3000nm) when using the Direct Detection Unit <sup>(note1)</sup>	
Drift	SolidSpec-3700 : Within 0.0002Abs/h (after 2 hours warm-up, 500nm, 1 second accumulation)	
	SolidSpec-3700DUV : Within 0.0003Abs/h (after 2 hours warm-up, 500nm, 1 second accumulation)	
Light source	50W halogen lamp (2000 hours life), Deuterium lamp (socket type, 1250 hours life for SolidSpec-3700, 300 hours life for SolidSpec-3700DUV)	
	The automatic position alignment is used for maximum sensitivity	
Monochromator	Grating - grating type monochromator	
	Pre-monochromator : Concave diffraction monochromator (2 switchable diffraction gratings)	
	Main monochromator : High-performance blazed holographic grating in aberration-corrected Czerny-Turner mounting (2 switchable diffraction gratings)	
Detector	Ultraviolet and visible region : R-928(SolidSpec-3700), R-955(SolidSpec-3700DUV)	
	Near-infrared region : InGaAs and cooled PbS cell for both	
Sample compartment	Inside dimensions : 900W x 700D x 350H (mm)      Maximum sample size : 700W x 560D x 40H (mm)	
Dimensions	1000W x 800D x 1200H (mm) (Not including the protruding portions)	
Weight	170Kg	
Ambient temperature	15 to 35 degrees centigrade	
Ambient humidity	35 to 80% (at room temperature 15 to 30 degrees centigrade), 35 to 70% (at room temperature 30 to 35 degrees centigrade) No condensation	
Power requirement	AC 100V/120V/220V/230V/240V, 50/60Hz 300VA <sup>(note2)</sup>	

The specifications shown above are determined after 2 hours warm-up.

Note1) Determined using the Direct Detection Unit DDU.

Note2) PC and printer are not included.



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