56 Sparta Avenue • Newton, New Jersey 07860
(973) 300-3000 Sales • (973) 300-3600 Fax
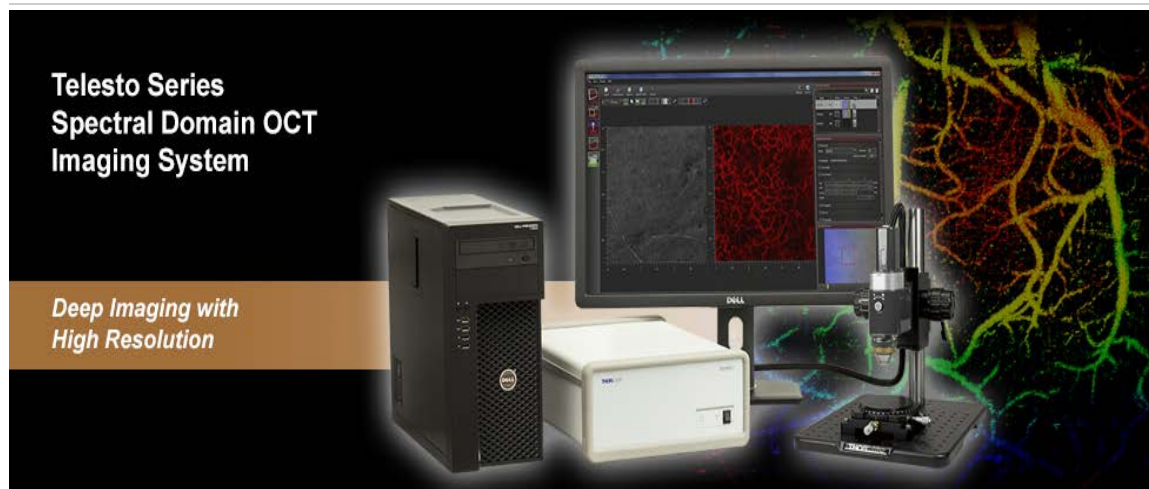www.thorlabs.com

THORLABS

TEL1325LV3-BU - April 12, 2017

Item # TEL1325LV3-BU was discontinued on April 12, 2017. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

TELESTO SERIES SD-OCT SYSTEMS

Telesto Series
Spectral Domain OCT
Imaging System

Deep Imaging with
High Resolution

Hide Overview

OVERVIEW

Features

- Configurable OCT Systems Optimized for High-Resolution Imaging with Deeper Penetration
    - 3.5 mm Imaging Depth with 5.5 μm Axial Resolution in Air (1300 nm Center Wavelength)
    - 7.0 mm Imaging Depth with 12.0 μm Axial Resolution in Air (1325 nm Center Wavelength)
- Base Units with Four A-Scan Rate Settings; Scan Rates Up to 76 kHz or up to 146 kHz Available
- 111 dB Max Sensitivity at 5.5 kHz Scan Rate or 109 dB Max Sensitivity at 10 kHz Scan Rate
- Includes Computer and ThorImage OCT Software Package (See the *Software* Tab)
- Build-Your-Own and Preconfigured Systems Available
- See the *Brochures* Tab for More Information on Thorlabs' OCT Systems

Let Thorlabs Help with Your Imaging Project!

We recognize that our customers have unique application requirements. For this reason, we stand ready to discuss how our OCT systems can be adapted to meet your needs. You can easily contact us directly at oct@thorlabs.com or via our online request form; an OCT representative will contact you shortly. We are happy to assist with purchasing or information requests:

[Contact Us]

- **Request a Quote**: E-mail us with a list of parts or specifications you want.
- **Technical Consultation:** Ask our engineers for help with configuring a system.
- **Sample Testing:** Send us your sample and let our engineers determine the right OCT configuration for you.
- **Request a Demo:** Demos are available for customers in the US and Europe through our Newton, NJ and Lübeck, Germany locations.
- **OEM and Custom Projects:** Click here to learn about our OEM capabilities.

Choose Components to Build or Customize Your OCT System

- Choose from High-Resolution (1300 nm) or Long-Range (1325 nm) Base Units
- Rigid, Cage-Compatible, and Handheld Scanners Available
- Scan Lens Kits to Optimize Lateral Resolution and Focal Length for Your Application
- Ring- and Immersion-Style Sample Z-Spacers for Air or Liquid Imaging Applications
- Scanner Stand and Translation Stage Accessories
- Contact Our OCT Team to Request a Quote and Discuss Building a System

OCT System Comparison

Customization Guide

Application Articles

Optical Coherence Tomography (OCT) is a noninvasive optical imaging technique that produces real-time, 2D cross-sectional and 3D volumetric images of a sample. This technique provides structural information about the sample based on light backscattered from different layers of material within that sample, producing images with micron-level resolution and millimeters of imaging depth. OCT imaging can be considered as an optical analog to ultrasound imaging that achieves higher resolution at the cost of decreased penetration depth. In addition to high resolution, the non-contact, noninvasive nature of OCT makes it well suited for imaging samples such as biological tissue, small animals, and industrial materials.

Thorlabs' Telesto OCT Imaging Systems provides the flexibility required for long-range and high-resolution imaging applications. The 64-bit software pre-installed on the included computer displays and processes 2D and 3D OCT data in real time. Choose from a number of scanner options including a robust rigid scanner, adjustable scanner, and the portable handheld scanner. Optional accessories are available below to customize your OCT system to meet the requirements of your application. Additionally, Thorlabs offers two complete, preconfigured OCT systems for 1300 or 1325 nm based on the components sold on this page.

The components below can also be used to upgrade your existing Thorlabs OCT system with additional features and are fully compatible out of the box with Thorlabs' OCT systems and accessories. While most systems are upgradable, we recommend contacting the OCT Team to determine the optimal solution for your system and intended application.
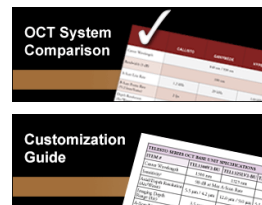
Click on the Image or Table Below to Jump to Details
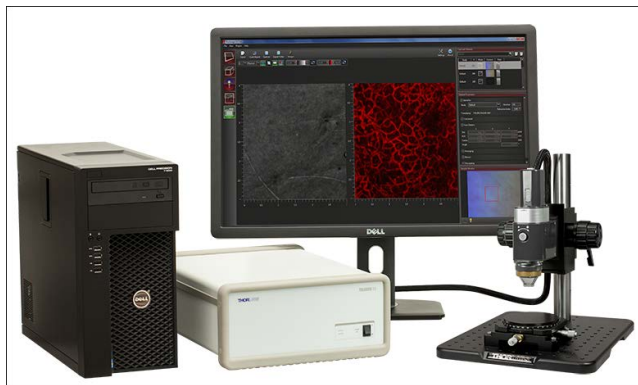
| Telesto Customization Options |
| --- |
| OCT Base Unit (Computer Included) |
| Scanning System |
| Scan Lens Kit |
| Reference Length Adapter |
| Sample Z-Spacer |
| Scanner Stand |
| Translation Stage |
| Preconfigured Systems (Not Shown) |

Hide Software

SOFTWARE

ThorImage OCT Software Index

- Introduction
- Imaging Modes
    - 2D Mode for Cross-sectional Imaging
    - 3D Mode for Volume Imaging
    - Doppler Mode for Doppler Flow Imaging
    - Speckle Variance Mode for Angiographic Imaging
- Externally-Triggered Acquisition for Synchronized Measurements
- Easy Probe Calibration for Different Configurations
- Video Showing Screencast of Rendering Capabilities

ThorImage OCT Software

- Interactive Scan Position Control through Video Display (Draw and Scan)
- Advanced Dataset Management
- High-Speed Volume Rendering of 3D Data
- Doppler and Speckle Variance Imaging
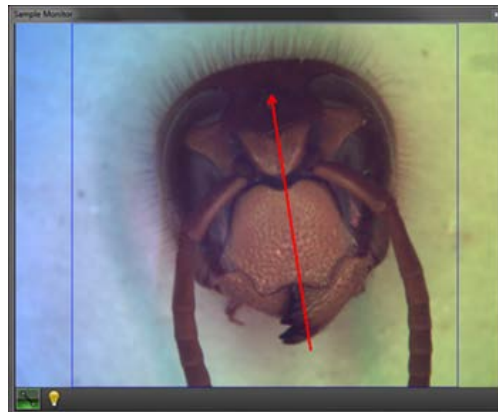- Versatile Scan and Acquisition Control
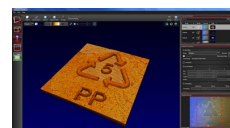
Click to Enlarge
The ThorImage OCT Window in Volume Rendering Mode

ThorImage OCT is high-performance data acquisition software that is included with all Thorlabs Spectral Domain OCT systems. This 64-bit Windows-based software package is capable of data acquisition, processing, scan control, and displaying OCT images. Additionally, NI LabVIEW and C-based Software Development Kits (SDKs) are available, which contain a complete set of libraries for measurement control, data acquisition and processing, as well as storage and display of OCT images. The SDKs provide the means for developing highly specialized OCT imaging software for every individual application.
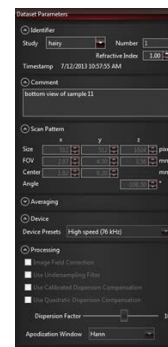
Scan Control

ThorImage OCT provides numerous scan and acquisition controls. The camera integrated in the probe of our OCT system provides live video images in the application software. Defining the scan line for 2D imaging or the scan area for 3D imaging is accomplished through the easy-to-use "Draw and Scan" feature by clicking on the video image. The scan pattern can also be adjusted by specifying parameters in the controls of the software. Additionally, one can further set processing parameters, averaging parameters, and the speed and sensitivity of the device using device presets. By using a high-speed preset, video-like frame rates in 2D and fast volume rendering in 3D are possible, whereas high-sensitivity acquisition is enabled by choosing a preset with a lower acquisition speed.

Click to Enlarge
Various acquisition parameters can be adjusted in ThorImage OCT.

Click to Enlarge
The Sample Monitor can be used to define the scan pattern using the "Draw and Scan" feature.

Dataset Management

ThorImage OCT provides advanced dataset management capabilities, which allow opening several datasets simultaneously. Datasets are uniquely defined using an identifier consisting of study (or test series) name and an experiment number. Grouping of datasets is possible using the same study name. The "Captured Datasets" list shows an overview of all open datasets, including the study name, the acquisition mode, and preview pictures of the still video image and the OCT data.

Datasets can be exported in various image formats, such as PNG, BMP, JPEG, PDF, or TIFF. Formats suited for post-processing purposes, such as RAW/SRM, FITS, VTK, VFF, and 32-bit floating-point TIFF, are also supported.

The OCT file format native to ThorImage OCT allows OCT data, sample monitor data, and all relevant metadata to be stored in a single file. ThorImage OCT can also be installed and run on computers without an OCT system installed in order to view data.
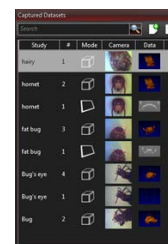
Click to Enlarge
The Dataset Management Window of ThorImage OCT

Third Party Applications

If ImageJ is installed on the computer with ThorImage OCT installed, opening acquired OCT data in ImageJ is one mouse click away, as shown in the image below. This enables a flawless workflow when requiring the advanced image processing functionality provided by ImageJ. Clicking the Explorer button shown below will open the folder and select the file in Windows Explorer where the currently active dataset is stored.
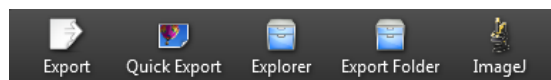

Export buttons are accessible in the Action Toolbar of ThorImage OCT.

Imaging Modes

Different OCT imaging modes can be selected using the mode selector. If the ThorImage OCT software finds a compatible system connected and switched on, all operational modes will be selectable. If no OCT device is present, only the data viewing mode for viewing and exporting OCT data will be available.

2D Mode

In the 2D imaging mode the probe beam scans in one direction, thus acquiring cross-sectional OCT images, which are then displayed in real time. Line averaging before or after the Fast Fourier Transform (FFT) is available as well as B-Scan averaging. Image display parameters, such as color mapping, can be controlled in this mode. We have also implemented an option for automatic calculation of the optimum contrast and brightness of the displayed OCT images.
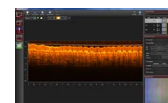
Click to Enlarge
The ThorImage OCT Window in 2D Mode

3D Mode

In the 3D imaging mode, the OCT probe beam scans sequentially across the sample to collect a series of 2D cross-sectional images, which are then processed to build a 3D image.

In the ThorImage OCT software, 3D volume datasets can be viewed as orthogonal cross-sectional planes (see below) and volume renderings.

The Sectional View features cross-sectional images in all three orthogonal planes, independent of the orientation in which the data was acquired. The view can be rotated as well as zoomed in and out.

The Rendering View provides a volumetric rendering of the acquired volume dataset. This view enables quick 3D visualization of the sample being imaged.

Planes of any orientation can be clipped to expose structures within the volume. The 3D image can be zoomed in and out as well as rotated. Furthermore, the coloring and dynamic range settings can be adjusted.

Utilizing the full potential of our high-performance software in combination with our high-speed OCT systems, we have included a Fast Volume Rendering mode in ThorImage OCT, which serves as a preview for high-resolution 3D acquisitions. In this mode, high-speed volume renderings can be displayed in real-time, providing rapid visualization of samples in three dimensions.
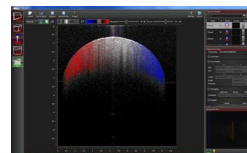

Click to Enlarge
Rendering
View

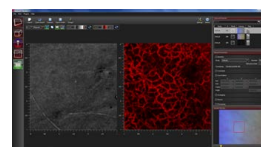Click to Enlarge
Sectional View

Doppler Mode

Doppler OCT imaging comes standard with all OCT systems. In the Doppler mode, phase shifts between adjacent A-scans are averaged to calculate the Doppler frequency shift induced by particle motion or flow. The number of lateral axial pixels can be modified to change velocity sensitivity and resolution during phase shift calculation. The Doppler images are displayed in the main window with a color map indicating forward- or backward-directed flow, relative to the OCT beam.

Click to Enlarge
Doppler dataset showing the velocity of a
rotated plastic stick.

Speckle Variance Mode

The speckle variance acquisition mode uses the variance of speckle noise to calculate angiographic images. It can be used to visualize three dimensional vessel trees without requiring significant blood flow and without requiring a specific acquisition speed window. The speckle variance data can be overlaid on top of intensity pictures providing morphological information. Different color maps can be used to display the multimodal pictures.

Click to Enlarge
Speckle variance measurement showing blood
vessels of a hand.

Externally-Triggered Acquisition

ThorImage OCT and the SDK APIs provide the ability to externally trigger the acquisition of A-Scans. This enables the user to synchronize measurements from different modalities (e.g. vibrometry and synchronized positioning) with an OCT measurement. Synchronization is greatly simplified with all current CameraLink-based Thorlabs OCT systems (a TTL level trigger signal source required). External triggering is available for all imaging modes and can be toggled in the settings dialog in ThorImage OCT.

Easy Probe Calibration

Changing to a different scan lens kit (sold below) will generally require a different probe configuration in order to adapt to changes in the optical parameters of the system. When an additional scan lens is purchased for your Thorlabs OCT scanner system, ThorImage OCT enables you to easily create a fitting configuration for your new scan lens by using the calibration sample shipped with the lens and an intuitive step-by-step calibration process (shown in the image to the right).

Click to Enlarge
Probe Calibration Window in
ThorImage OCT

Video Showing Screencast of ThorImage OCT Rendering Capabilities

In this video, OCT images of a finger are acquired and manipulated in the 3D volume and cross section modes.

Hide OCT Tutorial

OCT TUTORIAL

Optical Coherence Tomography Tutorial

Optical Coherence Tomography (OCT) is a noninvasive optical imaging modality that provides real-time, 1D depth, 2D cross-sectional, and 3D volumetric images with micron-level resolution and millimeters of imaging depth. OCT images consist of structural information from a sample based on light backscattered from different layers of material within the sample. It can provide real-time imaging and is capable of being enhanced using birefringence contrast or functional blood flow imaging with optional extensions to the technology.

Thorlabs has designed a broad range of OCT imaging systems that cover several wavelengths, imaging resolutions, and speeds, while having a compact footprint for easy portability. Also, to increase our ability to provide OCT imaging systems that meet each customer's unique requirements, we have designed a highly modular technology that can be optimized for varying applications.

Application Examples

Art
Conservation

Drug Coatings

3D Profiling

In-vivo

Small Animal

Biology

Tissue
Birefringence

Mouse Lung

OCT is the optical analog of ultrasound, with the tradeoff being lower

imaging depth for significantly higher resolution (see Figure

Retina Cone Cells

1). With up to 15 mm imaging range and better than 5 micrometers in axial resolution, OCT fills a niche between ultrasound and confocal microscopy.

In addition to high resolution and greater imaging depth, the non-contact, noninvasive advantage of OCT makes it well suited for imaging samples such as biological tissue, small animals, and materials. Recent advances in OCT have led to a new class of technologies called Fourier Domain OCT, which has enabled high-speed imaging at rates greater than 700,000 lines per second.[1]

Fourier Domain Optical Coherence Tomography (FD-OCT) is based on low-coherence interferometry, which utilizes the coherent properties of a light source to measure optical path length delays in a sample. In OCT, to obtain cross-sectional images with micron-level resolution, and interferometer is set up to measure optical path length differences between light reflected from the sample and reference arms.

There are two types of FD-OCT systems, each characterized by its light source and detection schemes: Spectral Domain OCT (SD-OCT) and Swept Source OCT (SS-OCT). In both types of systems, light is divided into sample and reference arms of an interferometer setup, as illustrated in Fig 2. SS-OCT uses coherent and narrowband light, whereas SD-OCT systems utilize broadband, low-coherence light sources. Back scattered light, attributed to variations in the index of refraction within a sample, is recoupled into the sample arm fiber and then combined with the light that has traveled a fixed optical path length along the reference arm. A resulting interferogram is measured through the detection arm of the interferometer.
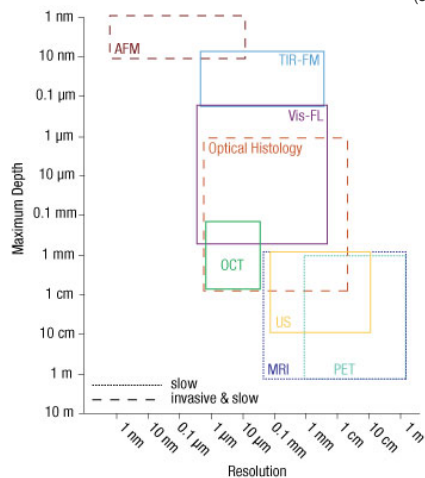
The frequency of the interferogram measured by the sensor is related to depth locations of the reflectors in the sample. As a result, a depth reflectivity profile (A-scan) is produced by taking a Fourier transform of the detected interferogram. 2D cross-sectional images (B-scans) are produced by scanning the OCT sample beam across the sample. As the sample arm beam is scanned across the sample, a series of A-scans are collected to create the 2D image.

Similarly, when the OCT beam is scanned in a second direction, a series of 2D images are collected to produce a 3D volume data set. With FD-OCT, 2D images are collected on a time scale of milliseconds, and 3D images can be collected at rates now below 1 second.

Click to Enlarge
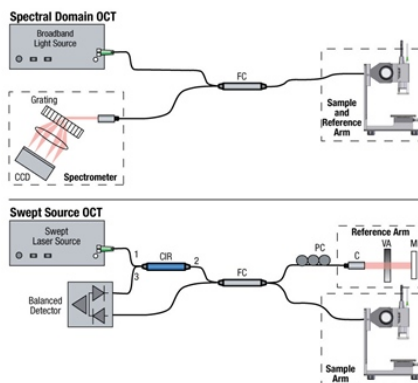**Figure 1**

Click to Enlarge
Figure 2

Spectral Domain OCT vs. Swept Source OCT

Spectral Domain and Swept Source OCT systems are based on the same fundamental principle but incorporate different technical approaches for producing the OCT interferogram. SD-OCT systems have no moving parts and therefore have high mechanical stability and low phase noise. Availability of a broad range of line cameras has also enabled development of SD-OCT systems with varying imaging speeds and sensitivities.
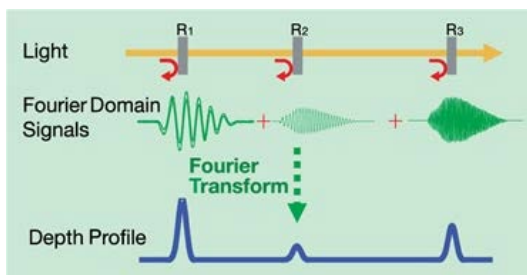
SS-OCT systems utilize a frequency swept light source and photodetector to rapidly generate the same type of interferogram. Due to the rapid sweeping of the swept laser source, high peak powers at each discrete wavelength can be used to illuminate the sample to provide greater sensitivity with little risk of optical damage.

Click to Enlarge

FD-OCT Signal Processing

In Fourier Domain OCT, the interferogram is detected as a function of optical frequency. With a fixed optical delay in the reference arm, light reflected from different sample depths produces interference patterns with the different frequency components. A Fourier transform is used to resolve different depth reflections, thereby generating a depth profile of the sample (A-scan).

[1] V.Jayaraman, J. Jiang, H.Li, P. Heim, G. Cole, B. Potsaid, J. Fujimoto, and A. Cable, "OCT Imaging up to 760 kHz Axial Scan Rate Using Single-Mode 1310 nm MEMs-Tunable VCSELs with 100 nm Tuning Range," CLEO 2011 - Laser Applications to Photonic Applications, paper PDPB2 (2011).

Hide Brochures

BROCHURES

Brochure and Configuration Chart

The buttons below link to PDFs of printable materials and a graphical customization guide for our Telesto Series OCT Systems.

Hide Selection Guide

SELECTION GUIDE

Thorlabs offers a wide variety of OCT Imaging Systems. To assist in narrowing down which OCT system(s) is best suited for your application, we have provided the guide below. We always encourage all customers to contact us directly at oct@thorlabs.com or via our online request form to discuss specific imaging requirements.

Item # (Click for Link)	CAL930V1-BU[a]	GAN930V2-BU[a]	GAN905HV2-BU[a]	TEL1300V2-BU[a]	TEL1300V3-BU[a]	TEL1325LV2-BU[a]	TEL1325LV3-BU[a]	VEG110[a]
Series Name	Callisto	Ganymede		Telesto				Vega
Type	Spectral Domain OCT							Swept Source OCT
Key Performance Feature	High-Sensitivity Imaging	High Resolution	Very High Resolution	High Axial Resolution		Deep Imaging		High-Speed and Long-Range Imaging
Center Wavelength	930 nm	930 nm	900 nm	1300 nm		1325 nm		1300 nm
A-Scan Line Rate	1.2 kHz	5.5 kHz to 36 kHz		5.5 kHz to 76 kHz	10 kHz to 146 kHz	5.5 kHz to 76 kHz	10 kHz to 146 kHz	100 kHz
Imaging Depth[b] (Air)	1.7 mm	2.9 mm	1.9 mm	3.5 mm		7.0 mm		12 mm
Imaging Depth[b] (Water)	1.3 mm	2.2 mm	1.4 mm	2.6 mm		5.3 mm		9.0 mm
Depth Resolution[b] (Air)	7.0 µm	6.0 µm	3.0 µm	5.5 µm		12 µm		16 µm
Depth Resolution[b] (Water)	5.3 µm	4.5 µm	2.2 µm	4.2 µm		9.0 µm		12 µm
Sensitivity (Max)[c]	107 dB	101 dB (at 5.5 kHz)		111 dB (at 5.5 kHz)	109 dB (at 10 kHz)	111 dB (at 5.5 kHz)	109 dB (at 10 kHz)	101 dB (at 100 kHz)

a. These Item #s are OCT base units that can be customized using a wide selection of OCT scanners, lens kits, and optional accessories.

b. Depth resolution and actual imaging depth are dependent on the optical properties of the sample being imaged.

c. Values for the Callisto, Ganymede, and Telesto systems are typical and were measured using a scanner with a common reference/sample path and 50% path split. The value measured for the Vega system is typical and was measured using a scanner with a dual path setup.

Hide Telesto Series Preconfigured Systems

Telesto Series Preconfigured Systems

TELESTO-II

- Complete OCT System Configurations (See Table to the Right)
  - Item # TELESTO-II: General-Purpose Imaging System
  - Item # TELESTO-II-1325LR: High-Depth Imaging System
- Fully Customizable Using Other Telesto Series Components

Item #	TELESTO-II	TELESTO-II-1325LR
Base Unit	TEL1300V2-BU	TEL1325LV2-BU
Center Wavelength	1300 nm	1325 nm
Scanning System	OCTG-1300 (Rigid Scanner)	
Scan Lens Kit	OCT-LK3	OCT-LK4
Reference Length Adapter	OCT-RA3	OCT-RA4
Accessories	OCT-STAND and OCT-XYR1	

These Telesto Series OCT System Configurations are built using the base units, scanning systems, lenses, and accessories sold on this page. The TELESTO-II configuration features a center wavelength of 1300 nm and is designed for general purpose imaging applications. Alternatively, the TELESTO-II-1325LR system has a 1325 nm center wavelength and is optimized for deep imaging applications. A OCTG-1300 Rigid Scanner and compatible reference length adapter are included with both systems.

The TELESTO-II and TELESTO-II-1325LR configurations are fully compatible with all Telesto Series OCT components. For information about these systems or to inquire about custom configurations, please contact oct@thorlabs.com and an OCT representative will get back to you shortly.

Part Number	Description	Price	Availability
TELESTO-II	Spectral Domain OCT Imaging System, 1300 nm, 76 kHz	$70,000.00	Lead Time
TELESTO-II-1325LR	Spectral Domain OCT Imaging System, 1325 nm, 76 kHz	$66,000.00	Lead Time

Hide OCT Base Units (Required OCT System Component)

OCT Base Units (Required OCT System Component)

TEL1300V2-BU

- 1300 nm or 1325 nm Center Wavelength Options
  - 1300 nm, High Resolution: 3.5 mm Depth and 5.5 µm Resolution in Air
  - 1325 nm, Long Range: 7 mm Depth and 12 µm Resolution in Air
- Each Base Unit has Four A-Scan Rates for Flexibility in Imaging Speed and Sensitivity
  - 5.5 kHz to 76 kHz A-Scan Rate; 111 dB Max Sensitivity
  - 10 kHz to 146 kHz A-Scan Rate; 109 dB Max Sensitivity

Also Required:
- Scanning System
- Scan Lens Kit
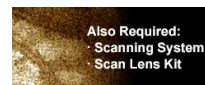
Computer Specifications[a]	
Operating System	Windows 7[b], 64 Bit
Processor	Quad Core, 3.6 GHz
Memory	32 GB
Hard Drive	512 GB SSD
Data Acquisition	Camera Link

The imaging performance of any OCT system is largely dependent on the design and components incorporated into the base unit. All of Thorlabs' OCT Base Units include an OCT engine, high-performance computer, pre-installed software, and a software development kit (SDK). For the Telesto OCT Base Units, the engine is comprised of a superluminescent diode light source, scanning electronics, and a linear InGaAs array-based spectrometer for detection. The engine and detection components are integrated into a 420 mm x 320 mm x 149 mm (16.55" x 12.61" x 5.88") unit. For a fully operational system, one scanning system and a scan lens kit (both sold separately below) must be purchased along with a base unit.

[a] Computer Specifications Subject to Change

[b] We are in the process of switching the pre-installed operating system; some computers may come with Windows 10 installed upon delivery. This will not affect the performance of the OCT software.

High-Resolution Base Units

Our TEL1300V2-BU and TEL1300V3-BU High-Resolution Base Units feature Thorlabs' highest resolution OCT imaging capability at 1300 nm. An ideal choice for high-resolution imaging in scattering samples, these base units utilize Thorlabs' unique matched pair superluminescent diodes for over 170 nm of bandwidth that translates to 5.5 µm axial resolution at an imaging depth of 3.5 mm. Two base units at this wavelength are available. The TEL1300V2-BU has a maximum 111 dB sensitivity (at 5.5 kHz) and a maximum A-scan rate of 76 kHz. The TEL1300V3-BU, on the other hand, offers a higher max A-scan rate of 146 kHz, but a lower maximum sensitivity (109 dB at 10 kHz).

Deep-Imaging Base Units

Thorlabs' TEL1325LV2-BU and TEL1325LV3-BU Deep-Imaging Base Units are designed using an optimized SLD1325 superluminescent diode that provides over 100 nm of spectral bandwidth and enables the base units to achieve a very high 7 mm imaging depth with 12 µm of axial imaging resolution. For these reasons, this base unit is the ideal choice for long-range imaging of highly-scattering samples in an air medium. Two base units at this wavelength are available. The TEL1325LV2-BU has a maximum 111 dB sensitivity (at 5.5 kHz) and a maximum A-scan rate of 76 kHz. The TEL1325LV3-BU, on the other hand, offers a higher max A-scan rate of 146 kHz, but a lower maximum sensitivity (109 dB at 10 kHz).

Item #	TEL1300V2-BU	TEL1300V3-BU	TEL1325LV2-BU	TEL1325LV3-BU
Description	High-Resolution Imaging		Long-Range Imaging	
Center Wavelength	1300 nm		1325 nm	
Imaging Depth (Air/Water)	3.5 mm / 2.6 mm		7 mm / 5.3 mm	
Depth Resolution (Air/Water)	5.5 µm / 4.2 µm		12 µm / 9.0 µm	
A-Scan Line Rate	5.5, 28, 48, or 76 kHz	10, 28, 76, or 146 kHz	5.5, 28, 48, or 76 kHz	10, 28, 76, or 146 kHz
Sensitivity[a]	98 dB (at 76 kHz Scan Rate) to 111 dB (at 5.5 kHz Scan Rate)	93 dB (at 146 kHz Scan Rate) to 109 dB (at 10 kHz Scan Rate)	98 dB (at 76 kHz Scan Rate) to 111 dB (at 5.5 kHz Scan Rate)	93 dB (at 146 kHz Scan Rate) to 109 dB (at 10 kHz Scan Rate)
Maximum Pixels per A-Scan	1024			
Compatible Scanners	OCTP-1300, OCTP-1300/M, OCTG-1300, and OCTH-1300			

[a] Typical Values Measured Using a Scanner with a Common Reference/Sample Path and 50% Path Split

Part Number	Description	Price	Availability
TEL1300V2-BU	Telesto OCT Base Unit, 1300 nm, 76 kHz (Max) A-Scan Rate, High Resolution	$54,000.00	Lead Time
TEL1300V3-BU	NEW! Telesto OCT Base Unit, 1300 nm, 146 kHz (Max) A-Scan Rate, High Resolution	$64,000.00	Lead Time
TEL1325LV2-BU	Telesto OCT Base Unit, 1325 nm, 76 kHz (Max) A-Scan Rate, Long Range	$50,000.00	Lead Time
TEL1325LV3-BU	NEW! Telesto OCT Base Unit, 1325 nm, 146 kHz (Max) A-Scan Rate, Long Range	$60,000.00	Lead Time

[Hide Scanning Systems (Required OCT System Component)](#)

Scanning Systems (Required OCT System Component)

- ▶ Scan an OCT Light Source Beam Across a Sample to Acquire 2D or 3D Images
- ▶ Three Available Options
  - ▶ Rigid Scanner for High Stability and Ease-of-Use
  - ▶ Adjustable Scanners with Open Construction for Customization of Scan Path
  - ▶ Portable Handheld Probe for Applications Requiring High Mobility

Click to Enlarge
Rigid OCT Scanner

Click to Enlarge
Adjustable OCT Scanner

Click to Enlarge
Handheld OCT Scanner

Thorlabs' OCT Scanning Systems are designed to scan the OCT light source beam across a sample for 2D cross-sectional and 3D volumetric imaging. OCT applications can vary widely, from live animal imaging to industrial materials analysis, with each requiring a different set of scanning parameters. We currently offer three scanning options for use with our Telesto base units: rigid scanners, adjustable scanners, and handheld probe.

Each scanner contains an OCT interferometer with a sample arm and a reference arm. The reference arm of the OCT interferometer is placed near the sample and housed within the scanning system itself to guarantee the phase stability of the sample arm relative to the reference arm. To account for different sample distances and reflectivities (e.g., while imaging through water), the reference arm path length, as well as the reference arm intensity, is adjustable. To minimize image distortion caused by dispersion, our OCT systems are designed to optically match the reference and sample arm lengths to the greatest extent possible. Dispersion effects from the sample (e.g., imaging through water or glass) can be compensated for using the included ThorImage OCT software. For customers interested in dual-path setups, any of these scanners can be configured without a beamsplitter; contact Tech Support for more information.

| Scanner Type	Item #	Compatible Base Unit
Rigid Scanner[a]	OCTG-1300	TEL1300V2-BU
Adjustable Scanner	OCTP-1300(/M)	TEL1300V3-BU
Handheld Scanner[b]	OCTH-1300	TEL1325LV2-BU
		TEL1325LV3-BU

a. Rigid Scanner Requires Purchase of Reference Length Adapter
b. Sample Z-Spacers Recommended When Using OCTH-1300

All scanners are equipped with an integrated camera that can obtain real-time *en face* video of the sample during OCT measurements when used with our ThorImage OCT software (see the *Software* tab for details). Illumination of the sample is provided by a ring of user-adjustable white light LEDs around the exit aperture of each scanner.

Rigid Scanner
The OCTG-1300 Rigid Scanner is ideal for imaging applications that require a stable, easy-to-operate setup. The entire design of the rigid scanner is contained within a rugged, light-tight housing that minimizes the risk of misalignment. The rigid scanner is equipped with a reference path length distance indicator for ease-of-use during reference adjustments. A knob located at the top of the rigid scanner allows for fine adjustments to the reference path length.

Also Required:
· Base Unit
· Scan Lens Kit
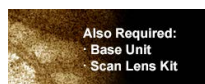
Click to Enlarge
OCTH-1300 Handheld
Scanner with OCTH-
AIR30 Sample Z-
Spacer

Adjustable Scanner
The OCTP-1300(/M) Adjustable Scanner is designed with an open construction to enable easy customization of the optical beam path using Thorlabs' standard optomechanical components. This scanner features SM1 (1.035"-40) ports and 4-40 tapped holes at several locations that allow mounting of SM1-threaded or 30 mm cage-compatible components, respectively. The scan lens port is directly compatible with either M25 x 0.75 or SM1-threaded components, and can be converted to other thread standards, such as RMS (0.800"-36) via our selection of thread adapters. Additional scanning and non-scanning optical input/output ports are available for integration of a laser for fluorescence excitation or additional sample illumination.

Compact Handheld Scanner
The compact and lightweight OCTH-1300 Handheld Scanner is specifically designed for applications requiring high mobility. Easy access buttons located directly on the scanner enable fingertip control of our ThorImage OCT Software. Users can program each button from a selection of imaging and acquisition software controls and the software uses visual and audio feedback for button presses. The OCTH-1300 features a removable cover under the handle that provides access to the reference length and intensity settings. Compatible scan lens kits and sample z-spacers for the OCTH-1300 are sold below; z-spacers help maintain the correct working distance when using the handheld scanner. Please note that due to the limitations of the internal MEMS scanner, the frame rate (i.e., B-Scan rate) is limited to 25 frames per second when using the handheld scanner.

Part Number	Description	Price	Availability
OCTP-1300/M	Customer Inspired!Adjustable OCT Scanner for 1300 nm / 1325 nm, Metric	$12,000.00	Lead Time
OCTG-1300	Rigid OCT Scanner for 1300 nm / 1325 nm	$11,500.00	Lead Time
OCTH-1300	Handheld OCT Scanner for 1300 nm / 1325 nm	$9,900.00	Lead Time
OCTP-1300	Customer Inspired!Adjustable OCT Scanner for 1300 nm / 1325 nm, Imperial	$12,000.00	Lead Time

[Hide Scan Lens Kits (Required OCT System Component)](#)

Scan Lens Kits (Required OCT System Component)

- ▶ Telecentric Scan Lenses Provide a Flat Imaging Plane
- ▶ Lens AR Coated for 1315 ± 65 nm
- ▶ Scan Lens Kits for Rigid / Adjustable Scanners Include
  - ▶ Telecentric Scan Lens
  - ▶ Illumination Tube
  - ▶ IR Card
  - ▶ Calibration Target
- ▶ Compact Scan Lens Kits Designed for the OCTH-1300 Handheld Probe with Integrated Scan Lens and Illumination Ring

Thorlabs' Scan Lens Kits enable easy exchange of scan lenses in an OCT system, providing the flexibility to

The cross-section images below of a finger pad were taken with the OCT-LK2 and OCT-LK4 scan lens kits using a Telesto Series OCT system. The combinations possible with the Telesto series offer extremely high flexibility in building an OCT system perfectly suited to your application.
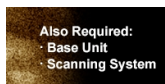

Also Required:
· Base Unit
· Scanning System

OCT-LK2 High Resolution
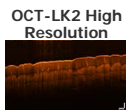
Click to Enlarge
Magnification: 10X
Scan Region: 6 mm x 3.5 mm
Lateral Resolution: 7 µm

OCT-LK4 Deep Imaging
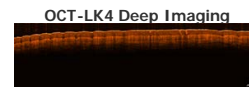
Click to Enlarge
Magnification: 3X
Scan Region: 16 mm x 3.5 mm
Lateral Resolution: 20 µm

tailor imaging resolution or working distance for each application. Based on our line of OCT telecentric scan lenses, these lens kits minimize image distortion without extensive post-image processing and maximize coupling of the light scattered or emitted from the sample surface into the detection system. As seen in the table below, we offer scan lens kits compatible with the rigid (Item # OCTG-1300) and cage-compatible (Item # OCTP-1300) scanners, as well as two lens kits compatible with the handheld scanner (Item # OCTH-1300).

Each kit includes a telecentric scan lens, illumination tube, IR card, and calibration target. The included illumination tube serves as a light guide that channels light from the LED illumination ring down to the sample area. The IR card and calibration target are provided for calibration of the scanning mirror and lens kit, ensuring the best image quality when swapping between scan lenses.

Item #	OCT-LK2	OCT-LK3	OCT-LK4	OCTH-LK20	OCTH-LK30
Click Image to Enlarge					
Design Wavelength	1300 nm / 1325 nm			1300 nm / 1325 nm	
Compatible Scanner	OCTG-1300 (Rigid) or OCTP-1300 (Adjustable)			OCTH-1300 Handheld Scanner	
Lateral Resolution[a]	7 µm	13 µm	20 µm	16.0 µm	24.0 µm
Focal Length	18 mm	36 mm	54 mm	20 mm	30 mm
Working Distance	3.4 mm (with Tube)[b] 7.5 mm (without Tube)	24.9 mm (with Tube)[b] 25.1 mm (without Tube)	41.6 mm (with Tube)[b] 42.3 mm (without Tube)	12 mm	22 mm
Field of View	6 mm x 6 mm	10 mm x 10 mm	16 mm x 16 mm	Ø8 mm	Ø10 mm
Lens Threading	M25 x 0.75	M25 x 0.75	M25 x 0.75	M20 x 0.5 (For Z-Spacer) M14 x 0.5 (For OCTH-1300)	

[a] 1/e² Beam Diameter at Focus
[b] The illumination tube is user-removable.

Part Number	Description	Price	Availability
OCT-LK2	OCT Scan Lens Kit, 18 mm FL, 1300 nm / 1325 nm	$1,900.00	Lead Time
OCT-LK3	OCT Scan Lens Kit, 36 mm FL, 1300 nm / 1325 nm	$1,300.00	Today
OCT-LK4	OCT Scan Lens Kit, 54 mm FL, 1300 nm / 1325 nm	$1,300.00	Lead Time
OCTH-LK20	OCT Scan Lens Kit for OCTH-1300, 20 mm FL	$990.00	Lead Time
OCTH-LK30	OCT Scan Lens Kit for OCTH-1300, 30 mm FL	$990.00	Lead Time

Hide Reference Length Adapters (Required for Rigid Scanners)

Reference Length Adapters (Required for Rigid Scanners)

▶ Arm Adapters for Matching Reference Path Length to the Sample Path Length
▶ Use Multiple Reference Adapters for Rapid Switching Between Scan Lens Kits
▶ Must be Purchased with Rigid Scanner (Item # OCTG-1300)

Item #[a]	Compatible Scan Lens Kit
OCT-RA2	OCT-LK2
OCT-RA3	OCT-LK3
OCT-RA4	OCT-LK4

These adapters adjust the reference arm path length within the OCTG-1300 Rigid Scanners to match the sample path length of the scan lens used. Choose from three options that are compatible with the scan lens kits sold above. Reference length adapters also enable the user to quickly swap between different scan lens kits without going through extensive adjustments during each switch. The table to the right provides a compatibility list to help select the appropriate reference adapters.

[a] Multiple reference adapters can be purchased for rapid switching between scan lens kits.

Part Number	Description	Price	Availability
OCT-RA2	Reference Arm Adapter for Rigid Scanner and OCT-LK2(-BB) Scan Lens Kit	$510.00	Lead Time
OCT-RA3	Reference Arm Adapter for Rigid Scanner and OCT-LK3(-BB) Scan Lens Kit	$510.00	Lead Time
OCT-RA4	Reference Arm Adapter for Rigid Scanner and OCT-LK4(-BB) Scan Lens Kit	$510.00	Lead Time

Hide Sample Z-Spacers (Optional Accessories)

Sample Z-Spacers (Optional Accessories)

Click to Enlarge
Z-Spacers for the OCTG-1300 and OCTP-1300(/M) Scanners

▶ Sample Z-Spacers Position Scanner at Optimal Working Distance From Sample
▶ Ring (Air) and Immersion (Liquid) Z-Spacers Available
▶ Two Z-Spacers Recommended for Use with OCTH-1300 Handheld Scanner

Thorlabs offers both ring and immersion style sample Z-spacers that enable optimal positioning of a scanning system relative to the sample. The OCT-AIR3, OCT-IMM3, and OCT-IMM4 Z-Spacers feature knurled rings that allow the spacing distance to be adjusted and locked in place for increased stability. Several Z-spacer options are available; please see the table below for compatibility with our scanners and lens kits.

Additionally, we offer two ring-style Z-spacers that are designed specifically for the OCTH-1300 Handheld Scanner; these spacers greatly assist in maintaining the correct sample working distance when using the handheld scanner. The spacing distance on the OCTH-AIR20 and OCTH-AIR30 Z-Spacers can be adjusted by rotating the spacer.

Click to Enlarge
Z-Spacers for the
OCTH-1300 Handheld
Scanner

Our ring-style Z-spacers provide a distance guide between the scanner and sample. The sample is in contact with the ring-shaped tip of the spacer and should only be used when air is the scanning medium. In contrast, our immersion spacers are equipped with a glass plate that contacts the sample surface within the scanning area. Unlike the ring-style spacers, immersion spacers enable access to samples contained within a liquid environment while also providing sample stabilization. Better index matching and a tilted glass plate also help reduce strong back reflections from the sample surface and enhances the contrast of the image.

Item #[a]	Type	Adjustable	Adjustment Range	Lockable	Compatible Scanner	Compatible Scan Lens Kit
OCT-AIR3	Ring (Air)	Yes	+3.5 mm / -1.0 mm	Yes	OCTG-1300 OCTP-1300(/M)	OCT-LK3
OCT-IMM3	Immersion	Yes	+3.4 mm / -1.1 mm	Yes		
OCT-IMM4	Immersion	Yes	+1.0 mm / -17.0 mm	Yes		OCT-LK4
OCTH-AIR20	Ring (Air)	Yes	±4 mm	No	OCTH-1300[a]	OCTH-LK20
OCTH-AIR30	Ring (Air)	Yes	±2 mm	No		OCTH-LK30

a. We recommend purchasing a sample z-spacer if using the OCTH-1300 handheld scanner.

Part Number	Description	Price	Availability
OCT-AIR3	Ring-Style Sample Z-Spacer for OCT-LK3(-BB) Scan Lens Kit	$714.00	Lead Time
OCT-IMM3	Immersion-Style Sample Z-Spacer for OCT-LK3(-BB) Scan Lens Kit	$867.00	3-5 Days
OCT-IMM4	Immersion-Style Sample Z-Spacer for OCT-LK4(-BB) Scan Lens Kit	$969.00	Lead Time
OCTH-AIR20	Ring-Style Sample Z-Spacer for OCTH-LK20(-BB) Scan Lens Kit	$184.00	Lead Time
OCTH-AIR30	Ring-Style Sample Z-Spacer for OCTH-LK30(-BB) Scan Lens Kit	$184.00	Lead Time

Hide Scanner Stand (Optional Accessory)

Scanner Stand (Optional Accessory)

- ▶ Recommended Stand for Mounting Rigid or Adjustable Scanners
- ▶ Focus Block with Coarse/Fine Z-Axis Travel on Ø1.5" Stainless Steel Post
- ▶ 12" x 14" (300 mm x 350 mm) Aluminum Breadboard with 1/4"-20 (M6) Tapped Holes
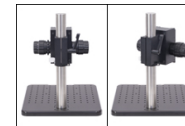
Click for Details
The focus block can be rotated 45° to move the scanner head away from the sample.

For convenient mounting of our Rigid or Adjustable Scanners, we offer a scanner stand that is ideal for use in vibration-sensitive studies such as angiography. It consists of a post-mounted focus block with knobs that provide both coarse (40 mm/rev) and fine (225 µm/rev) z-axis travel. A rotation and height collar underneath the focus block allows it to rotate 45° in order to move the scanner head away from the sample to make adjustments.

The focus block attaches to a 12" x 14" (300 mm x 350 mm) aluminum breadboard via the included Ø1.5" post. The aluminum breadboard has side grips and rubber feet for easy lifting and transportation. There is an array of 1/4"-20 (M6) tapped holes for mounting optomechanics. Four extra 1/4"-20 (M6) tapped holes allow the mounting of the OCT-XYR1 Translation Stage (sold below) to the OCT-STAND and the OCT-XYR1/M Translation Stage to the OCT-STAND/M directly underneath the scan lens. A 1/4"-20 (M6) counterbore is also provided for securing the Ø1.5" post.

Part Number	Description	Price	Availability
OCT-STAND/M	Stand for Rigid and Adjustable OCT Scanning Systems, M6 Tapped Holes	$2,000.00	Today
OCT-STAND	Stand for Rigid and Adjustable OCT Scanning Systems, 1/4"-20 Tapped Holes	$2,000.00	Today

Hide Translation Stage (Optional Accessory)

Translation Stage (Optional Accessory)

OCT-XYR1

- ▶ Optional Translation Stage with 0.5" (13 mm) of XY Travel and 360° Rotation
- ▶ Includes Cover Plate for Sample Mounting
- ▶ Can Mount Optomechanics by Removing Cover Plate

Specifications	
Horizontal Load Capacity (Max)	10 lbs (4.5 kg)
Mounting Platform Dimensions	Ø4.18" (Ø106 mm)
Stage Height	1.65" (41.8 mm)
Linear Translation Range	1/2" (13 mm)
Travel per Revolution	0.025" (0.5 mm)
Graduation	0.001" (10 µm) per Division

Click to Enlarge
The cover plate is removable for access to tapped holes and the SM1-threaded central hole.

Precise translation and rotation are often required for optimal positioning of a sample before and during OCT imaging. The OCT-XYR1(/M) is an XY linear translation stage with a rotating platform and solid plate for sample mounting and easy cleaning. The OCT-XYR1 or OCT-XYR1/M stage can be secured to the OCT-STAND or OCT-STAND/M, respectively, using the 1/4" (M6) counterbores at the corners. The top plate is removable for access to 4-40, 8-32 (M4), and 1/4"-20 (M6) tapped holes and an SM1-threaded (1.035"-40) central hole for mounting optomechanical components. The XYR1A Solid Sample Plate can be purchased separately as a direct replacement for the top plate.

The X and Y micrometers offer 1/2" (13 mm) of travel with graduations every 0.001" (10 µm). The stage's rotation and translation can be freely changed without compromising the stability of attached components. An engraved angular scale along the outer edge of the stage's rotating platform allows the user to set the angular orientation of the stage, which can then be fixed using the 5/64" (2 mm) hex locking setscrew. Locking the rotation of the stage does not prevent XY translation using the actuators.

Part Number	Description	Price	Availability
OCT-XYR1/M	XY Stage with Solid Top Plate, 13 mm Travel, 360° Rotation, Metric Taps	$714.00	Today
OCT-XYR1	XY Stage with Solid Top Plate, 1/2" Travel, 360° Rotation, Imperial Taps	$714.00	Today