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THORLABS

TLS001-635 - MAR 20, 2018

Item # TLS001-635 was discontinued on MAR 20, 2018. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

T-CUBE LASER SOURCE

- ► Two Available Wavelength Models: 635 nm and 1550 nm
- ► Single Mode Interface with FC/PC Connector Point
- ► USB Plug-and-Play with Full Software Control Suite

TLS001-1550
Power Supply
Sold Separately

APT™ Software Included

OVERVIEW

Features

- Compact T-Cube Footprint
- Single Mode Fiber Interface with FC/PC Plug
- 635 nm or 1550 nm Wavelengths Available
- USB Plug-and-Play
- Manual- or PC-Controlled Operation via USB
- Safety Enable Key Switch
- Laser Safety Interlock Jack
- Software Control Suite Included
- Extensive ActiveX® Programming Interfaces
- Software Compatible With Other APT™ Controllers

Click to Enlarge
Back View of TLS001-1550 Laser Source

Click to Enlarge
A KCH301 USB Controller Hub with installed TLS001-635 T-Cube and KST101 K-Cube module. A KAP102 Adapter Plate is used to mount the TLS001-635 to the hub.

The TLS001 T-Cube Laser Source is a fully functional, highly compact laser source incorporating driver electronics and an FC/PC (wide 2.1 mm key compatible) connected pigtailed laser diode in both 635 nm and 1550 nm variants. The internally-pigtailed Fabry-Perot laser diode is connected to the rear panel FC feedthrough via a single mode fiber. With this fiber-to-fiber connection at the output, these devices deliver more useful optical power than air-to-fiber systems that use a receptacle with embedded optics. It can be controlled manually or via a USB interface. The output laser power is monitored continuously and a feedback circuit adjusts the laser power to achieve a constant output power.

T-Cube Light Source & Driver Modules
Laser Diode Driver
Laser Sources
High Power LED Driver

Multiple T-Cube units can be connected to a single PC using a USB Controller Hub (KCH301 or KCH601) with the KAP102 Adapter Plate, as shown in the image to the right.

Power Supply Options
The preferred power supply (i.e., single channel, multi-channel, or hub-based) depends on the end user's application and whether you already own compatible power supplies. To that end and in keeping with Thorlabs' green initiative, we do not ship these units bundled with a power supply. This avoids the cost and inconvenience of receiving an unwanted single channel supply if a multi-channel or hub-based system would be more appropriate. The power supply options compatible with the TLS001 T-Cube Laser Source are listed in the table below.

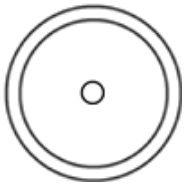
Note: The laser must be turned off when connecting or disconnecting a fiber from the input. Please ensure the fiber tip and connector bulkhead are clean prior to use; the FBC1 Bulkhead and Connector Cleaner can be used to clean the bulkhead and connecting fiber.

SPECS

Specification		TLS001-635	TLS001-1550
Wavelength	Minimum	630 nm	1530 nm
	Typical	635 nm	1550 nm
	Maximum	645 nm	1590 nm
Maximum Full Output Power		4.0 mW	1.5 mW
Stability		±0.1 dB	
Display Accuracy		±10%	
Set Point Resolution		0.01 mW	
Operating Temperature		15 to 35 °C	
Storage Temperature		0°C to 50 °C	
Specification		TLS001-635	TLS001-1550
Modulation Input		0-10 V = 0 to Full Power, DC or Sine Wave Input Only	
Modulation Bandwidth		5 kHz Full Depth of Modulation 10 kHz 33% Depth of Modulation	
Power Input		5 V, 1.6 A	
General			
Housing Dimensions (W x D x H)		120 mm x 60 mm x 47 mm (4.8" x 2.4" x 1.8")	
Weight		280 g (9.88 oz)	
Output Fiber Connector		FC/PC (Wide 2.1 mm Key Compatible)	

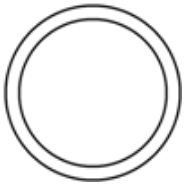
PIN DIAGRAMS

Ext In
SMA Female



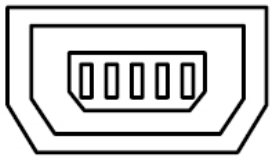
Used to control the intensity of the laser output from an external source. This input can be driven from a 0 to 10 V voltage source. The input impedence is 13 kΩ.

Interlock
3.5 mm Stereo Phono Jack Plug



Interlock Jack must be shorted with included plug or external user gate before laser may be enabled.

Computer Connection
USB Mini-B*



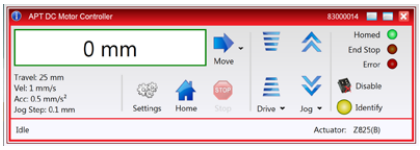
*USB type A to type Mini-B cable included.

MOTION CONTROL SOFTWARE

Thorlabs offers two platforms to drive our wide range of motion controllers: our Kinesis® software package or the legacy APT™ (Advanced Positioning Technology) software package. Either package can be used to control devices in the Kinesis family, which covers a wide range of motion controllers ranging from small, low-powered, single-channel drivers (such as the K-Cubes and T-Cubes) to high-power, multi-channel, modular 19" rack nanopositioning systems (the APT Rack System).

The Kinesis Software features .NET controls which can be used by 3rd party developers working in the latest C#, Visual Basic, LabVIEW™, or any .NET compatible languages to create custom applications. Low-level DLL libraries are included for applications not expected to use the .NET framework. A Central Sequence Manager supports integration and synchronization of all Thorlabs motion control hardware.

Our legacy APT System Software platform offers ActiveX-based controls which can be used by 3rd party developers working on C#, Visual Basic, LabVIEW™, or any Active-X compatible languages to create custom applications and includes a simulator mode to assist in developing custom applications without requiring hardware.



Kinesis GUI Screen

By providing these common software platforms, Thorlabs has ensured that users can easily mix and match any of the Kinesis and APT controllers in a single application, while only having to learn a single set of software tools. In this way, it is perfectly feasible to combine any of the controllers from single-axis to multi-axis systems and control all from a single, PC-based unified software interface.

APT GUI Screen

The software packages allow two methods of usage: graphical user interface (GUI) utilities for direct interaction with and control of the controllers 'out of the box', and a set of programming interfaces that allow custom-integrated positioning and alignment solutions to be easily programmed in the development language of choice.

A range of video tutorials is available to help explain our APT system software. These tutorials provide an overview of the software and the APT Config utility. Additionally, a tutorial video is available to explain how to select simulator mode within the software, which allows the user to experiment with the software without a controller connected. Please select the *APT Tutorials* tab above to view these videos, which are also available on the software CD included with the controllers.

Software
Kinesis Version 1.14.7

The Kinesis Software Package, which includes a GUI for control of Thorlabs' Kinesis and APT™ system controllers.

Also Available:

- Software rotocol

Software
APT Version 3.21.2

The APT Software Package, which includes a GUI for control of Thorlabs' APT™ and Kinesis system controllers.

Also Available:

- Software rotocol

KINESIS TUTORIALS

The Kinesis Software features new .Net controls which can be used by 3rd party developers working in the latest LabVIEW, C# .Net, VB .NET, or any other .Net compatible languages to create custom applications.

C#

This programming language is designed to allow multiple programming paradigms, or languages, to be used, thus allowing for complex problems to be solved in an easy or efficient manner. It encompasses typing, imperative, declarative, functional, generic, object-oriented, and component-oriented programming. By providing functionality with this common software platform, Thorlabs has ensured that users can easily mix and match any of the Kinesis controllers in a single application, while only having to learn a single set of software tools. In this way, it is perfectly feasible to combine any of the controllers from the low-powered, single-axis to the high-powered, multi-axis systems and control all from a single, PC-based unified software interface.

The Kinesis System Software allows two methods of usage: graphical user interface (GUI) utilities for direct interaction and control of the controllers 'out of the box', and a set of programming interfaces that allow custom-integrated positioning and alignment solutions to be easily programmed in the development language of choice.

For a collection of example projects that can be compiled and run to demonstrate the different ways in which developers can build on the Kinesis motion control libraries, please on the link below.

Click Here for C# Example Projects
Click Here for Quick Start Device Control Examples

LabVIEW

LabVIEW can be used to communicate with any Kinesis- or APT-based controller via .Net controls. In LabVIEW, you build a user interface, known as a front panel, with a set of tools and objects and then add code using graphical representations of functions to control the front panel objects. The LabVIEW tutorial, provided below, provides some information on using the .Net controls to create control GUIs for Kinesis- and APT-driven devices within LabVIEW. It includes an overview with basic information about using controllers in LabVIEW and explains the setup procedure that needs to be completed before using a LabVIEW GUI to operate a device.

Click Here to View the LabVIEW Guide

APT TUTORIALS

These videos illustrate some of the basics of using the APT System Software from both a non-programming and a programming point of view. There are videos that illustrate usage of the supplied APT utilities that allow immediate control of the APT controllers out of the box. There are also a number of videos that explain the basics of programming custom software applications using Visual Basic, LabView and Visual C++. Watch the videos now to see what we mean.

Click here to view the video tutorial

To further assist programmers, a guide to programming the APT software in LabView is also available.

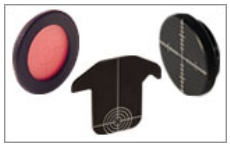
Click here to view the LabView guide

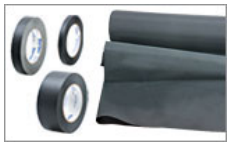
LASER SAFETY

Laser Safety and Classification

Safe practices and proper usage of safety equipment should be taken into consideration when operating lasers. The eye is susceptible to injury, even from very low levels of laser light. Thorlabs offers a range of laser safety accessories that can be used to reduce the risk of accidents or injuries. Laser emission in the visible and near infrared spectral ranges has the greatest potential for retinal injury, as the cornea and lens are transparent to those wavelengths, and the lens can focus the laser energy onto the retina.

Safe Practices and Light Safety Accessories





- Thorlabs recommends the use of safety eyewear whenever working with laser beams with non-negligible powers (i.e., > Class 1) since metallic tools such as screwdrivers can accidentally redirect a beam.
- Laser goggles designed for specific wavelengths should be clearly available near laser setups to protect the wearer from unintentional laser reflections.
- Goggles are marked with the wavelength range over which protection is afforded and the minimum optical density within that range.
- Laser Safety Curtains and Blackout Materials can prevent direct or reflected light from leaving the experimental setup area.
- Thorlabs' Enclosure Systems can be used to contain optical setups to isolate or minimize laser hazards.
- A fiber-pigtailed laser should always be turned off before connecting it to or disconnecting it from another fiber, especially when the laser is at power levels above 10 mW.
- All beams should be terminated at the edge of the table, and laboratory doors should be closed whenever a laser is in use.
- Do not place laser beams at eye level.
- Carry out experiments on an optical table such that all laser beams travel horizontally.
- Remove unnecessary reflective items such as reflective jewelry (e.g., rings, watches, etc.) while working near the beam path.
- Be aware that lenses and other optical devices may reflect a portion of the incident beam from the front or rear surface.
- Operate a laser at the minimum power necessary for any operation.
- If possible, reduce the output power of a laser during alignment procedures.
- Use beam shutters and filters to reduce the beam power.
- Post appropriate warning signs or labels near laser setups or rooms.
- Use a laser sign with a lightbox if operating Class 3R or 4 lasers (i.e., lasers requiring the use of a safety interlock).
- Do not use Laser Viewing Cards in place of a proper Beam Trap.

Laser Classification

Lasers are categorized into different classes according to their ability to cause eye and other damage. The International Electrotechnical Commission (IEC) is a global organization that prepares and publishes international standards for all electrical, electronic, and related technologies. The IEC document 60825-1 outlines the safety of laser products. A description of each class of laser is given below:

Class	Description	Warning Label
1	This class of laser is safe under all conditions of normal use, including use with optical instruments for intrabeam viewing. Lasers in this class do not emit radiation at levels that may cause injury during normal operation, and therefore the maximum permissible exposure (MPE) cannot be exceeded. Class 1 lasers can also include enclosed, high-power lasers where exposure to the radiation is not possible without opening or shutting down the laser.	
1M	Class 1M lasers are safe except when used in conjunction with optical components such as telescopes and microscopes. Lasers belonging to this class emit large-diameter or divergent beams, and the MPE cannot normally be exceeded unless focusing or imaging optics are used to narrow the beam. However, if the beam is refocused, the hazard may be increased and the class may be changed accordingly.	
2	Class 2 lasers, which are limited to 1 mW of visible continuous-wave radiation, are safe because the blink reflex will limit the exposure in the eye to 0.25 seconds. This category only applies to visible radiation (400 - 700 nm).	

Class	Description	Warning Label
2M	Because of the blink reflex, this class of laser is classified as safe as long as the beam is not viewed through optical instruments. This laser class also applies to larger-diameter or diverging laser beams.	
3R	Lasers in this class are considered safe as long as they are handled with restricted beam viewing. The MPE can be exceeded with this class of laser, however, this presents a low risk level to injury. Visible, continuous-wave lasers are limited to 5 mW of output power in this class.	
3B	Class 3B lasers are hazardous to the eye if exposed directly. However, diffuse reflections are not harmful. Safe handling of devices in this class includes wearing protective eyewear where direct viewing of the laser beam may occur. In addition, laser safety signs lightboxes should be used with lasers that require a safety interlock so that the laser cannot be used without the safety light turning on. Class-3B lasers must be equipped with a key switch and a safety interlock.	
4	This class of laser may cause damage to the skin, and also to the eye, even from the viewing of diffuse reflections. These hazards may also apply to indirect or non-specular reflections of the beam, even from apparently matte surfaces. Great care must be taken when handling these lasers. They also represent a fire risk, because they may ignite combustible material. Class 4 lasers must be equipped with a key switch and a safety interlock.	
All class 2 lasers (and higher) must display, in addition to the corresponding sign above, this triangular warning sign		

T-Cube Laser Source (Power Supply Not Included)

Power supplies sold separately below.

Part Number	Description	Price	Availability
TLS001-635	**T-Cube Laser Source, 635 nm, 4.0 mW Max (Power Supply Not Included)**	**$1,157.70**	**3-5 Days**
TLS001-1550	**T-Cube Laser Source, 1550 nm, 1.5 mW Max (Power Supply Not Included)**	**$1,157.70**	**Today**

Compatible Power Supplies

The TPS101 supplies power for one T-Cube Laser Source or T-Cube TEC Controller. It provides 5 V and 2.0 A. A location-specific adapter plug is shipped with the power supply based on your location.

The KCH301 and KCH601 USB Controller Hubs each consist of two parts: the hub, which can support up to three (KCH301) or six (KCH601) K-Cubes or T-Cubes, and a power supply that plugs into a standard wall outlet and powers the hub and any connected cubes. In addition, the hub provides USB connectivity to any docked K-Cube or T-Cube through a single USB connection.

A KAP101 or KAP102 Adapter Plate (sold separately) is required for each T-Cube to operate on the KCH301 or KCH601 controller hub. The KAP101 is designed to adapt 60 mm wide T-Cubes to the hubs, while the KAP102 is designed to adapt 120 mm wide T-Cubes to the hubs. For more information on the USB Controller Hubs, see the full web presentation.

Part Number	Description	Price	Availability
TPS101	**5 V, 2.0 A Power Supply Unit for One Laser Source T-Cube**	**$37.33**	**Today**
KCH301	**USB Controller Hub and Power Supply for Three K-Cubes or T-Cubes**	**$494.70**	**Today**
KCH601	**USB Controller Hub and Power Supply for Six K-Cubes or T-Cubes**	**$598.74**	**Today**
KAP101	**Adapter Plate for KCH Series Hubs and 60 mm Wide T-Cubes**	**$57.38**	**Today**
KAP102	**Adapter Plate for KCH Series Hubs and 120 mm Wide T-Cubes**	**$62.48**	**Today**

Visit the *T-Cube Laser Source* page for pricing and availability information:
https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=2922