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THORLABS

TLK-G0900M - November 10, 2017

Item # TLK-G0900M was discontinued on November 10, 2017. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

TUNABLE LASER KIT COMPONENTS

- **Components for ECL Kits Offer Highly Customizable Solutions**
- **Switch Between Littrow and Littman Cavity Configurations**

TLK-G0750M
Littman
Grating Module

TLK-PZT1
Fine-Tuning Piezo Actuator

TLK-LGP
Shown with
Littman Grating Module

TLK-LMM
Littman Mirror Module

TLK-352330-B
Mounted Aspheric
Collimating Lens

TLK-P26
Tunable Laser Kit
Gain Chip Mounting Plate

OVERVIEW

Features

- Components Compatible with Thorlabs' Tunable Laser Kits
- Convert Laser Between Littman and Littrow Configurations
- Alter Cavity to Support Other Gain Chips

This page includes products that are direct replacements of standard components in the Tunable Laser Kit and can be used to customize a tunable laser kit's performance. By using these components, customers can replace standard components, switch between cavity configurations, and alter the laser's performance. The images and tables immediately below label the components in our standard Tunable Laser Kits.

Littman Tunable Laser Kits

Label	Description	Label	Description
A	Tuning Motor Mount	F	Collimating Lens
B	Gain Chip Mounting Plate	G	Littman Grating Platform
C	Half Butterfly Gain Chip	H	Littman Grating Module
D	Collimation Adjuster	I	Littman Mirror Module
E	Mode Hop Adjuster	J	Tuning Motor

Click to Enlarge

Littrow Tunable Laser Kits

Label	Description	Label	Description
A	Tuning Motor Mount	E	Mode Hop Adjuster
B	Gain Chip Mounting Plate	F	Collimating Lens
C	Half Butterfly Gain Chip	G	Littrow Grating Module
D	Collimation Adjuster	H	Tuning Motor

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GAIN CHIP SPECS

All quoted values are typical, unless otherwise indicated. Please see the gain chip's Spec Sheet (linked below) for the most detailed information on performance. The *Graphs* tab describes the typical performance obtained in an external cavity laser configuration.

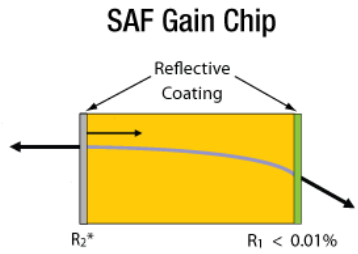
This link opens a document that contains a comprehensive list of performance specifications and performance plots.

General Specifications										
Item #	Spec Sheet	Reference Cavity	CWL[a]	Tuning Range[a, b]	Peak Power[a]	Chip Gain[c]	Gain Ripple	R_1	R_2	Chip Length
TFP780A		TLK-L780M	770 nm	30 nm	50 mW	-	3 dB	0.01%	90%[d]	0.75 mm
SAF1171S		TLK-L780M	1050 nm	60 nm	8 mW	30 dB	2.5 dB (Max)	0.005%	10%[e]	1 mm
SAF1175S		Littmann Cavity (Offered as OEM)	1220 nm	90 nm	40 mW	17 dB	0.5 dB	0.005%	10%[e]	1 mm
SAF1174S		TLK-L1300R	1310 nm	100 nm	50 mW	35 dB	0.35 dB	0.005%	10%[e]	2 mm
SAF1450S2		TLK-L1450R	1450 nm	120 nm	40 mW	20 dB	0.4 dB (Max)	0.005%	10%[e]	1.5 mm
SAF1550S2		TLK-L1550R	1550 nm	120 nm	40 mW	17 dB	0.6 dB (Max)	0.005%	10%[e]	1 mm
SAF1550P2		TLK-L1550R	1550 nm	120 nm	40 mW	17 dB	0.6 dB (Max)	0.005%	10%[e]	1 mm
SAF1900S		TLK-L1900M	1900 nm	120 nm	7 mW	18 dB	1.5 dB	0.005%	20%[e]	2 mm

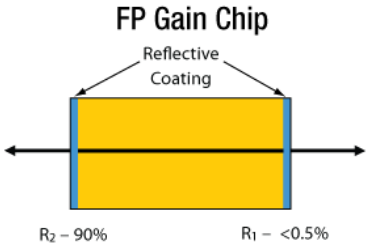
- The values given in the highlighted columns were measured in the specified reference cavity. Different external cavities will produce different performance specifications.
- 10 dB point.
- Single-pass optical gain at center of gain curve.
- Refer to the FP chip reflectivity diagram below.
- Refer to the SAF chip reflectivity diagram below.

ASE Specifications					
Item #	Center Wavelength (Typ.)	3 dB Bandwidth (Typ.)	ASE Current	Operating Current (Typ.)	Operating Current (Max)
TFP780A	780 nm	30 nm	80 mA (Typ.)	140 mA	180 mA
SAF1171S	1050 nm	60 nm	150 mA (Max)	-	150 mA
SAF1175S	1220 nm	80 nm	200 mA (Typ.)	200 mA	-
SAF1174S	1320 nm	80 nm	600 mA (Typ.)	500 mA	800 mA
SAF1450S2	1450 nm	100 nm	500 mA (Max)	-	500 mA
SAF1550S2	1550 nm	80 nm	300 mA (Typ.)	300 mA	600 mA
SAF1550P2	1550 nm	80 nm	300 mA (Typ.)	300 mA	600 mA
SAF1900S	1930 nm	150 nm	400 mA (Typ.)	500 mA	800 mA

Note: The light polarization is vertical inside the Fabry-Perot Gain Chip, while the light polarization is horizontal inside the SAF Gain Chips.



*R_2 = 10% for all models in the SAF series except the SAF1900S, for which R_2 = 20%.

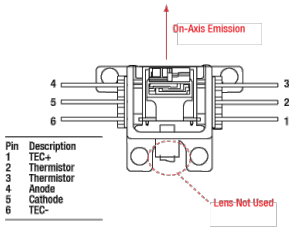


Fabry-Perot Gain Chip Lasing Performance Using Littman Tunable Laser Kit

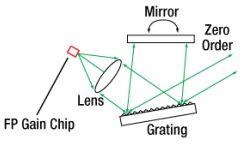
The Fabry-Perot (FP) laser diode has the two parallel ends of the semiconductor cleaved atomically flat to produce an oscillating cavity. Laser light is typically emitted through one of these highly reflective edges, using the semiconductor as the gain medium. FP lasers typically lase in a single longitudinal mode and exhibit temperature-dependent tunability over a small range. Since the end facets of the chip form the laser cavity, different longitudinal modes also appear in the emission, broadening the linewidth (100 - 1000 GHz). Given below are the typical TFP780A spectra and details on the packaged devices.

Item #	Center Wavelength	Power vs. Current	Power Spectrum
TFP780A	770 nm		

Fabry-Perot Gain Chip Drawing



Basic Littman Configuration



SAF Gain Chip Lasing Performance Using Littrow Tunable Laser Kit

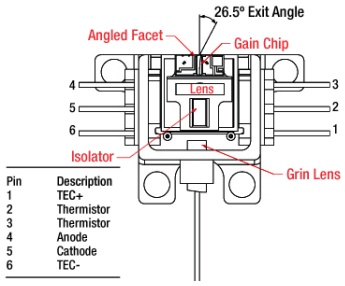
The innovative design of an SAF gain chip is ideal for use in external cavity lasers because it virtually eliminates unwanted feedback from the intracavity facet of the gain chip. These devices offer superior performance in a wide variety of external cavity configurations. Given below are typical spectra and details on the packaged devices.

Item #	Center Wavelength	Power vs. Current	Power Spectrum
SAF1171S	1050 nm		
SAF1175S	1220 nm		
SAF1174S[a]	1320 nm		
SAF1450S2	1450 nm		
SAF1550S2	1550 nm		
SAF1550P2	1550 nm		
SAF1900S	1900 nm		

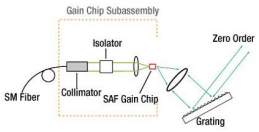
- Please note that the fluctuations in the power spectrum between 1350 and 1380 nm are associated with water vapor absorption. The power at these wavelengths can be improved by purchasing the TLK-E sealed laser enclosure and purging the enclosure with gas.

Fiber-Coupled SAF Gain Chip Drawing

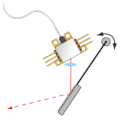
Basic Littrow Configuration



Pin	Description
1	TEC+
2	Thermistor
3	Thermistor
4	Anode
5	Cathode
6	TEC-



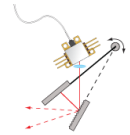
CAVITY CONFIGURATION



Littrow Schematic
Click to Enlarge

Lasers consist of an active gain element and optical feedback to this gain element. The most common diode lasers are based on a Fabry-Perot design with a linear waveguide and reflective surfaces at both ends of the gain chip to provide feedback. Some Fabry-Perot lasers are constructed for external feedback, but this is rare. Single angle facet (SAF) gain chips, on the other hand, have a curved waveguide with only one internally reflective endface and rely on external optical feedback to produce lasing.

Cavity Design	Littrow	Littman-Metcalf
High Output Power	x	
Wide Tuning Range	x	
Narrow Linewidth		x
Stationary 0th Order Beam		x



Littman Schematic
Click to Enlarge

Through the use of an external feedback mechanism, a user is able to tune a laser cavity to sustain a desired wavelength with minimal linewidth. This is highly desirable for many applications, particularly in metrology where precision is essential. Littrow and Littman-Metcalf configurations are the two most common ways to build an External Cavity Laser (ECL). Many other ECL configurations are based on these designs, but typically modify the cavity with additional optical components. Littrow cavities have minimal losses and thus intrinsically offer higher power, while Littman-Metcalf cavities produce a narrower linewidth.

A Littrow cavity provides feedback to the gain element through the use of a grating. One end of the gain element must allow light to exit, such as the design of an SAF. Light emitted from this end is first collimated. A grating then diffracts this collimated beam with the 1st order diffraction coupled back into the gain element, which allows it to support lasing. Wavelength tuning of the laser is possible by altering the angle of the grating relative to the cavity. 0th order diffraction from the grating will exit the laser's cavity at an angle dependent on the grating angle.

Littman-Metcalf configured ECLs use both a grating and a mirror for tuning. Similar to the Littrow configuration, light emitted from the uncoated end of the gain element must first be collimated. This beam is then diffracted by a grating. The 0th order diffraction reflects off of a mirror back on to the grating, where it is diffracted a second time before being coupled back into the gain element. Since light is diffracted twice, losses are higher (power loss), but the side mode suppression ratio (SMSR) is increased to produce a narrower linewidth laser. In this configuration the grating remains stationary, while the mirror is turned to tune the laser cavity's supported wavelength. Unlike with Littrow lasers, the direction of the 0th order free space beam remains stationary, which can be beneficial in some applications.

Many modifications to these cavities can be made to produce a higher polarization extinction ratio (PER) or to improve the SMSR. We always seek to tailor our products to our customers' applications. Please contact Tech Support and let us know what accessories would benefit your application.

CONVERSION GUIDE

Littman Cavity Configurations

These are the differentiating components of each Littman Tunable Laser Kit. The Gain Chip, Top Plate, Grating Module, and Collimating Lens are the components you will need to convert from one supported wavelength to the next. If you are converting your Littrow Tunable Laser Kit to a Littman configuration, you will also need to purchase a Littman Mirror Module (TLK-LMM) and a Littman Grating Platform (TLK-LGP).

Included in Kit Item #	Center Wavelength	Gain Chip	Top Plate	Grating Module	Collimating Lens
TLK-L780M	770 nm	TFP780A	TLK-P00	TLK-G1500M	TLK-352330-B[a]
TLK-L1050M	1050 nm	SAF1171S	TLK-P26	TLK-G1150M	TLK-352330-B[a]
TLK-L1300M	1310 nm	SAF1174S	TLK-P26	TLK-G0900M	TLK-352330-C[b]
TLK-L1550M	1550 nm	SAF1550S2	TLK-P26	TLK-G0750M	TLK-352330-C[b]
TLK-L1900M	1900 nm	SAF1900S	TLK-P26	TLK-G0600M	TLK-352330-C[b]

- Current TLKs use the 352230-B lens instead of the 352330-B lens used in the TLK-352330-B. However, using the TLK-352330-B will not affect the performance of the TLK.
- Current TLKs use the 352230-C lens instead of the 352330-C lens used in the TLK-352330-C. However, using the TLK-352330-C will not affect the performance of the TLK.

Littrow Cavity Configurations

These are the differentiating components of each Littrow Tunable Laser Kit. The Gain Chip, Top Plate, Grating Module, and Collimating Lens are the components you will need to convert from one supported wavelength to the next. If you are converting from a Littman to a Littrow configuration, you will not need any additional components than the ones listed below.

Included in Kit Item #	Center Wavelength	Gain Chip	Top Plate	Grating Module	Collimating Lens[a]
TLK-L1220R	1220 nm	SAF1175S	TLK-P26	TLK-G1350R2	TLK-352330-C
TLK-L1300R	1310 nm	SAF1174S	TLK-P26	TLK-G1350R	TLK-352330-C
TLK-L1450R	1450 nm	SAF1450S2	TLK-P26	TLK-G1050R2[b]	TLK-352330-C
TLK-L1550R	1550 nm	SAF1550S2	TLK-P26	TLK-G1050R	TLK-352330-C
TLK-L1950R	1950 nm	SAF1900S	TLK-P26	TLK-G0900R	TLK-352330-C

- Current TLKs use the 352230-C lens instead of the 352330-C lens used in the TLK-352330-C. However, using the TLK-352330-C will not affect the performance of the TLK.
- Available Online Soon

Tunable Laser Gain Chips with TEC

- Gain Chips Mounted for Easy Integration into External Cavity Lasers
- Half-Butterfly Assembly with Thermoelectric Cooler
- AR Coating Eliminates Unwanted Reflections, Increasing Laser Stability, Output Power, and Spectral Quality
- FP Chip Designed for Use in a Free-Space Littman Cavity
- SAF Chips Feature 1.0 m Long (Min), SM or PM Tight Jacket Pigtail with FC/APC Connector

Click the icon below for more detailed performance specifications. The SAF gain chips can also be coupled to PM fiber. Please contact Tech Support for more information on customization and quotes.

Note: The TFP780A does not include a fiber-coupled output.

Gain Chip Item #	Compatible Laser Kits	Typical Center Wavelength*
TFP780A	TLK-L780M	770 nm
SAF1171S	TLK-L1050M	1050 nm
SAF1175S	TLK-L1220R	1220 nm
SAF1174S	TLK-L1300M TLK-L1300R	1320 nm
SAF1450S2	TLK-1450R	1450 nm
SAF1550S2	TLK-L1550M TLK-L1550R	1550 nm
SAF1550P2	TLK-L1550M TLK-L1550R	1550 nm
SAF1900S	TLK-L1900M TLK-L1950R	1900 nm

*Center wavelength of the specified reference cavity.

Item #	Info	ASE Center Wavelength	ASE 3 dB Bandwidth	Peak Gain	Gain Ripple
TFP780A		780 nm	30 nm	-	3 dB
SAF1171S		1060 nm	60 nm	30 dB	2.5 dB (Max)
SAF1175S		1220 nm	80 nm	17 dB	0.5 dB
SAF1174S		1320 nm	80 nm	35 dB	0.35 dB
SAF1450S2		1450 nm	100 nm	20 dB	0.4 dB (Max)
SAF1550S2		1550 nm	80 nm	17 dB	0.6 dB (Max)
SAF1550P2		1550 nm	80 nm	17 dB	0.6 dB (Max)
SAF1900S		1900 nm	150 nm	18 dB	1.5 dB

All values typical unless otherwise noted. See the *Gain Chip Specs* tab for more information.

Part Number	Description	Price	Availability
TFP780A	**Mounted FP Gain Chip, Half Butterfly Pkg, CWL = 780 nm**	**$2,332.00**	**3-5 Days**
SAF1171S	**Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1050 nm, SM Fiber**	**$3,170.00**	**Today**
SAF1175S	**Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1220 nm, SM Fiber**	**$2,649.00**	**Today**
SAF1174S	**Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1320 nm, SM Fiber**	**$2,649.00**	**Today**
SAF1450S2	**Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1450 nm, SM Fiber**	**$2,649.00**	**Today**
SAF1550S2	**Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1550 nm, SM Fiber**	**$2,649.00**	**Today**
SAF1550P2	**Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1550 nm, PM Fiber**	**$2,802.00**	**Today**

SAF1900S	Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1900 nm, SM Fiber	$2,649.00	Today

Hide Mounting Plates for Half-Butterfly Gain Chips

Mounting Plates for Half-Butterfly Gain Chips

- Mounting Plates for 0° or 26.5° Angled Facets
- Select Based on Lateral Beam Exit Angle of Gain Chip

Thorlabs offers half-butterfly gain chip mounting plates that properly angle the gain chip relative to the rest of the laser cavity. Mounting plates may be interchanged on both Littman and Littrow cavity configurations to pair with a gain chip to generate the desired output wavelength. Please see the table to the right for the correct top plate based on the cavity configuration.

The gain chip mounting plates feature a 6-pin half butterfly mount and preconnected pin recepticles. Mounting plate connections are made to the tunable laser kit via gold-plated, spring-loaded connectors on the bottom of the plate. Note that mounting plates for TO-packaged diodes are listed below.

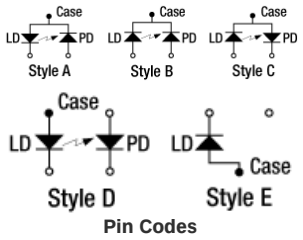
Mounting Plate Item #	Compatible Lasers	Laser Center Wavelength
TLK-P00	TLK-L780M	770 nm
TLK-P26	TLK-L1050M	1050 nm
	TLK-L1300M	1310 nm
	TLK-L1300R	1310 nm
	TLK-L1550M	1550 nm
	TLK-L1550R	1550 nm
	TLK-L1900M	1900 nm
	TLK-L1950R	1950 nm

Part Number	Description	Price	Availability
TLK-P00	Tunable Laser Kit Mounting Plate, 0°	$383.00	Lead Time
TLK-P26	Tunable Laser Kit Mounting Plate, 26.5°	$383.00	Today

Hide Mounting Plates for AR-Coated Laser Diodes in TO Cans

Mounting Plates for AR-Coated Laser Diodes in TO Cans

- Mounts Ø5.6 mm or Ø9 mm Diodes
- Integrated TEC and Thermistor
- Four-Pin Socket Accepts A, B, C, D, or E Pin Configurations (See Right)



Pin Codes

These mounting plates integrate TO-packaged laser diodes into Thorlabs' Tunable Laser Kits. They are drop-in replacements for the standard Half-Butterfly Mounting Plates. As TO-packaged diodes are readily available with various center wavelengths, this represents an economical solution for building a customized tunable laser that operates at wavelengths for which a half-butterfly gain chip is not available.

The mounting plates incorporate a 10 kO thermistor into the diode bracket for accurate temperature readings, and a 1.5 A TEC element is placed in contact with this bracket via thermal grease, providing excellent heat transfer. If greater thermal control is required, the TEC element may be replaced with a larger TEC by the user.

These mounting plates ship ready to accommodate either a Ø5.6 mm or a Ø9 mm diode. Regardless of which model is ordered, a supplementary bracket is included to accept the other diode package size. When changing between brackets, ensure that the thermistor is disconnected from the wiring harness and re-apply thermal grease to the TEC element before re-attaching a laser diode bracket.

Installation Notes
To insert a laser diode in to the mounting plate, first remove the retaining ring from the bracket with an SPW301 spanner wrench. Next, insert a laser diode. Now thread the retaining ring behind the diode to secure it in the mount. Attach the laser diode socket to the diode and route the wires to the proper connection on the mounting plate.

Part Number	Description	Price	Availability
TLK-PM5	Customer Inspired!Tunable Laser Kit Mounting Plate for Ø5.6 mm TO-Packaged Laser Diodes	$694.00	Today
TLK-PM9	Customer Inspired!Tunable Laser Kit Mounting Plate for Ø9 mm TO-Packaged Laser Diodes	$694.00	Today

Hide Tunable Laser Kit Base Module

Tunable Laser Kit Base Module

- Base Plate of Tunable Laser Kit
- Includes Controller Interface with Laser Polarity Switches

The TLK-BM allows users to customize their Tunable Laser Kit so that it best suits their application. This base module is the common mounting plate on which all other tunable laser components are mounted. The table below lists many possible cavity configurations based on the gain chip used. A component or set of components from each column should be acquired to construct a tunable laser. While standard Tunable Laser Kits use a half-butterfly gain chip, AR-coated diodes

and laser diodes may also be used. For help choosing the appropriate components for your tunable laser or for custom parts (i.e., other gratings), please contact Tech Support.

The base module includes a controller interface with polarity switches to support different AR-coated and laser diodes.

What You'll Need to Build a Tunable Laser with the TLK-BM					
Gain Chip	**Top Plate**	**Tuning Optics**	**Wavelength Tuning**	**Mode Hop Adjuster**	**Collimation**
Half Butterfly	Half-Butterfly Mounting Plate	Littrow Grating Module OR Littman Grating Module Littman Grating Platform Littman Mirror Module	1/4"-80 Threaded Actuator Mount 1/4"-80 Threaded Tuning Actuator OR Ø9.5 mm Actuator Mount Ø9.5 mm (Ø3/8") Tuning Actuator	Mode Hop Adjuster	Mounted Collimating Lens Focus Adjuster
AR-Coated Diode*	TO-Packaged Diode Mounting Plates				
Laser Diode					

*Available Third Party

Part Number	Description	Price	Availability
TLK-BM	**Customer Inspired!Tunable Laser Kit Base Module, Includes LD/TEC Controller Interface**	**$1,227.00**	**3-5 Days**

Littrow Grating Modules

- Grating Modules for Operation at 980, 1220, 1310, 1550, or 1950 nm
- Includes Pivot Bracket, Arm, and Grating

Thorlabs offers five holographic reflection gratings featuring 900, 1050, 1350, or 1800 grooves/mm for use with TLK Series Littrow Tunable Laser Kits. The gratings are premounted on a pivot arm for easy installation into existing Tunable Laser Kits.

Littrow Grating Item #	Compatible Littrow Kit	Optimal Center Wavelength
TLK-G1800R	N/A	980 nm
TLK-G1350R2*	TLK-L1220R	1220 nm
TLK-G1350R*	TLK-L1300R	1310 nm
TLK-G1050R	TLK-L1550R	1550 nm
TLK-G0900R	TLK-L1950R	1950 nm

*Position of grating on arm differs between both 1350 grooves/mm products.

Part Number	Description	Price	Availability
TLK-G1800R	**Littrow Grating Module for Littrow Tunable Laser Kits, 1800 g/mm, 980 nm Operation**	**$1,729.00**	**Today**
TLK-G1350R2	**Littrow Grating Module for Littrow Tunable Laser Kits, 1350 g/mm, 1220 nm Operation**	**$1,729.00**	**3-5 Days**
TLK-G1350R	**Littrow Grating Module for Littrow Tunable Laser Kits, 1350 g/mm, 1310 nm Operation**	**$1,729.00**	**Today**
TLK-G1050R	**Littrow Grating Module for Littrow Tunable Laser Kits, 1050 g/mm, 1550 nm Operation**	**$1,677.00**	**Lead Time**
TLK-G0900R	**Littrow Grating Module for Littrow Tunable Laser Kits, 900 g/mm, 1950 nm Operation**	**$1,647.00**	**Today**

Littman Grating Modules

- Grating Modules for Operation Centered at 770, 1050, 1310, 1550, or 1900 nm
- Includes Grating and Mount

Thorlabs offers five holographic reflection gratings featuring 600, 750, 900, 1150, or 1500 grooves/mm for use at 1900, 1550, 1310, 1050, or 770 nm, respectively. The gratings, 17.0 mm x 7.3 mm, are premounted for easy installation into existing Tunable Laser Kits. When convertng from Littrow to Littman configurations, a TLK-LGP grating platform is also required.

Littman Grating Item #	Compatible Littman Kit	Optimal Center Wavelength
TLK-G1500M	TLK-L780M	770 nm
TLK-G1150M	TLK-L1050M	1050 nm
TLK-G0900M	TLK-L1300M	1310 nm
TLK-G0750M	TLK-L1550M	1550 nm
TLK-G0600M	TLK-L1900M	1900 nm

Part Number	Description	Price	Availability
TLK-G1500M	**Littman Grating Module for Littman Tunable Laser Kits, 1500 g/mm**	**$648.00**	**3-5 Days**
TLK-G1150M	**Customer Inspired!Littman Grating Module for Littman Tunable Laser Kits, 1150 g/mm**	**$495.00**	**3-5 Days**
TLK-G0900M	**Littman Grating Module for Littman Tunable Laser Kits, 900 g/mm**	**$648.00**	**Lead Time**
TLK-G0750M	**Littman Grating Module for Littman Tunable Laser Kits, 750 g/mm**	**$597.00**	**3-5 Days**

TLK-G0600M	Customer Inspired!Littman Grating Module for Littman Tunable Laser Kits, 600 g/mm	$357.00	Lead Time

Hide Littman Grating Platform

Littman Grating Platform

- Mount for Grating in a Littman Tunable Laser Kit
- Easily Rotate and Lock Grating at Correct Angle


Click to Enlarge

The TLK-LGP Grating Platform is designed to securely hold a Littman grating module within the tunable laser kit assembly. The image to the right shows the TLK-G0900M grating mounted in the platform. To rotate the grating, simply loosen the M3 cap screw with the included hex key, and rotate the grating using the knurled knob below the platform. The platform is secured to the laser kit with two M4 cap screws and washers, which are also included.

Part Number	Description	Price	Availability
TLK-LGP	Littman Grating Platform for Littman Tunable Laser Kits	$90.00	3-5 Days

Hide Littman Mirror Module

Littman Mirror Module

- Mirror Module for Littman Tunable Laser Kit
- Premounted Mirror for Easy Installation
- Front Silvered Mirror

The Littman Mirror Module for Thorlabs' Tunable Laser Kit features a premounted, front silvered mirror for easy installation. The mirror, 25.0 mm x 18.0 mm, is mounted to a radial arm controlled by the Tunable Laser Kit.

Part Number	Description	Price	Availability
TLK-LMM	Littman Mirror Module for Tunable Laser Kits	$1,381.00	Lead Time

Hide Tuning Actuator Mounts

Tuning Actuator Mounts

- Mirror / Grating Actuator Motor Mount
- Radial Arm Retainer Spring
- TLK-MM1: 1/4"-80 Internal Thread Designed for Z812 Actuator
- TLK-MM2: Designed for Ø9.5 mm (Ø3/8") Barrel Actuators

Thorlabs offers two tuning actuator mounts. The first is the TLK-MM1, which has a 1/4"-80 threaded bushing. It is the standard tuning actuator mount included with tunable laser kits and is ideal for mounting the Z812 DC servo motor (below). The second tuning actuator mount is the TLK-MM2. This mount has a clamp for Ø9.5 mm (Ø3/8") barrel actuators. This allows the integration of actuators such as our PE4 manual and piezo drive or the Mitutoyo 148-142 high-resolution micrometer.

Part Number	Description	Price	Availability
TLK-MM1	1/4"-80 Threaded, Z8 Tuning Motor Mount for Tunable Laser Kits	$230.00	Lead Time
TLK-MM2	Ø9.5 mm (3/8") Barrel Tuning Motor Mount for Tunable Laser Kits	$230.00	3-5 Days

Hide DC Motor Tuning Actuator

DC Motor Tuning Actuator

- Direct Replacement for TLK Tuning DC Servo Motor
- 12 mm Travel
- 29 nm Theoretical Resolution
- 3 mm/s Max Velocity

The Z812 is the standard DC servo motor used in Thorlabs' Tunable Laser Kits. Its 1/4"-80 threaded barrel mounts to the TLK-MM1 Tuning Motor Mount. We recommend using the KDC101 Kinesis® Controller for this actuator.

Part Number	Description	Price	Availability
Z812	12 mm Motorized Actuator, 1/4"-80 Thread (0.5 m Cable)	$616.00	Today

Fine-Tuning Piezo Actuator

- Wavelength Tuning Open-Loop Piezo Actuator
- Use in Tandem with Main Tuning Actuator
- 9.1 µm Max Displacement
- 150 V Max, 100 V Recommended Drive Voltage
- 0.75 µF ± 20% Capacitance @ 1 kHz, 1 V_{RMS}

This piezo module attaches to the grating pivot arm (Littrow) or mirror pivot arm (Littman) via its M12 x 1.25 threaded housing to provide fine wavelength tuning of a Tunable Laser Kit. The standard tuning actuator is a Z812 DC servo motor, which offers 12 mm of travel and a minimum incremental movement of 0.05 µm. The piezo module is used in tandem with the Z812 tuning actuator, allowing the user to access the full tuning range, while also having the ability to finely tune the wavelength. The TLK-PZT1 has a BNC connector for use with Thorlabs open-loop piezo controllers. The table below lists the incremental wavelength tuning of the tunable laser kits when the TLK-PZT1 is integrated into them.

Littman Item #	TLK-L780M	TLK-L1050M	TLK-L1300M	TLK-L1550M	TLK-L1900M
Incremental Tuning	7 pm/µm	10 pm/µm	13 pm/µm	15 pm/µm	20 pm/µm
Littrow Item #	**TLK-L1220R**	**TLK-L1300R**	**TLK-L1550R**	**TLK-L1950R**	
Incremental Tuning	10 pm/µm	7 pm/µm	14 pm/µm	18 pm/µm	

Part Number	Description	Price	Availability
TLK-PZT1	Piezo Adjuster, 9.1 µm Travel	$398.00	Today

Mode Hop Adjuster

- Adjuster Designed to Minimize Mode Hopping
- Fine Push Adjustment
- Securely Fasten with Cap Screws

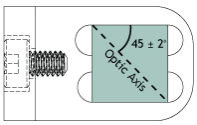
Thorlabs' Mode Hop Adjuster is designed to adjust the pivot point of the radial arm in a tunable laser to eliminate fluctuations in the laser's intensity/power at a given mode. The adjuster is designed to push the pivot bracket which the radial arm is mounted to. Once the desired position is reached, the pivot bracket can be secured to the kit base plate.

Please Note: The Mode Hop Adjuster is not designed to pull the radial arm stage. The pivot bracket must be manually reset to the starting position, followed by fine push adjustment by the adjuster.

Part Number	Description	Price	Availability
TLK-MHA1	Mode Hop Adjuster for Tunable Laser Kits	$1,381.00	Lead Time

Half-Wave Plate

- Zero-Order, Half-Wave Plate
- 780 nm Center Wavelength
- Mounts to Collimation Lens, Featured Below
- Optic Axis Oriented at 45° ± 2° with Respect to the Mount (See Drawing to Right)
- Custom Wave Plates Available, Contact Technical Support for Details



The TLK-WPH780 is a zero-order, half-wave plate for use with tunable laser kits. This mounted wave plate is most useful when working with short wavelength devices in TO can packaging where the user can optimize both the beam axis orientation (to illuminate the maximum number of grating lines) and the polarization of the light incident on the external cavity grating.

Part Number	Description	Price	Availability

TLK-WPH780	780 nm Mounted Half-Wave Plate	$337.00	Today

Mounted Aspheric Collimating Lenses

- Mounted Aspheric Lenses
- Available in Two Coatings: 600 - 1050 nm or 1050 - 1620 nm

Collimating Lens Item #	Compatible Laser Kit	Center Wavelength
TLK-352330-B	TLK-L780M	770 nm
TLK-352330-C	TLK-L1300M	1310 nm
TLK-352330-C	TLK-L1550M	1550 nm

Thorlabs' offers two different Mounted Aspheric Lenses for use in the Tunable Laser Kit. The premounted lenses offer easy integration and alignment. The TLK-352330-B Collimating Lens incorporates a Ø5.00 mm, f = 3.1 mm, NA = 0.68 Geltech Aspheric Lens with AR coating for 600 - 1050 nm (Part # 352330-B). The TLK-352330-C Collimating Lens incorporates a Ø5.00 mm, f = 3.1 mm, NA = 0.68 Geltech Aspheric Lens with AR coating for 1050 - 1620 nm (Part # 352330-C).

Part Number	Description	Price	Availability
TLK-352330-B	Tunable Laser Kit Collimating Lens, AR Coating: 600-1050 nm	$187.00	Lead Time
TLK-352330-C	Tunable Laser Kit Collimating Lens, AR Coating: 1050-1620 nm	$187.00	Today

Focus Adjuster

- Stainless Steel Body Flexure Focus Adjuster
- Provides 0.3 mm Travel
- 100 TPI Adjuster
- Steel Lead Screw with Steel Ball Contacting a Sapphire Disk

Thorlabs' Flexure Focus Adjuster provides a precise and stable linear adjustment of the aspheric lens in the Tunable Laser Kit. Fine adjustment is achieved using the 100 TPI adjustment screw. A steel lead screw with steel bearing contacting a sapphire disk along with the flexure mechanism provides enhanced stability. The Mounted Aspheric Collimating Lens is secured to the Focus Adjuster using two M3 x 0.5 cap screws. The Focus Adjuster is secured to the Gain Chip Mounting Plate using two M3 cap screws.

Part Number	Description	Price	Availability
TLK-FM1	Flexure Focus Adjuster for Tunable Laser Kits	$495.00	3-5 Days

Enclosure and Accessories

- Enclosure Protects Cavity and Allows for Purging
- Heater Kit Stabilizes Enclosure & Cavity Temperature
- Steering Mirrors for TLK-E Align Free-Space Laser Beams to Optical Table

The TLK-E enclosure is essential for the most sensitive applications. Designed to act as a sealed container, it allows the user to purge the system with gas to remove absorption lines. Thorlabs' Pure Air Circulator Unit, which generates an extremely dry, nearly particle-free environment, can be attached to the TLK-E enclosure with the use of hose adapters. To provide temperature stability beyond that of the thermoelectric cooler included with the gain chip, a heater kit (TLK-H) can be added. This heater attaches between the base plate of a Tunable Laser Kit and the bottom plate of the enclosure. By connecting a TC200 temperature controller, the temperature of the whole enclosure can be precisely stabilized. The TC200CAB10 connector cable can be used to connect the TLK-H to the TC200 controller.

When using a free-space tunable laser kit, it is often desirable to have your emitted beam aligned to your optical table (i.e., beam path follows the hole matrix). The TLK-SM-1 steering mirrors redirect the beam of a free-space Littman configuration beam so that it is aligned to the hole matrix. Please note that these mirrors attach to the base of the enclosure, and thus the enclosure is required.

Part Number	Description	Price	Availability
TLK-E	Tunable Laser Kit Enclosure	$1,841.00	Today
TLK-SM-1	Steering Mirror for Littman TLK w/ Enclosure, 1 Mirror Element	$363.00	3-5 Days