INTELLIGENT TUNABLE LASER DIODE SOURCE  
(PATENT: USA 7067993)

Features:
- User tunable wavelength
- User controllable power level
- Excellent power and wavelength stability over wide operating temperature
- Very short warm-up time
- Serial port for computer control
- Small size, low cost

Applications:
- DWDM network testing
- Component testing
- Instrument wavelength and power calibration
- General lab use

Product Description:
The Tunable Laser Diode Source from OZ Optics is a compact optical source providing a user controllable wavelength and output power level. Using a unique temperature compensation system, the source is able to provide excellent stability in both wavelength and power. Unlike many sources that are accurate at only the calibration temperature, OZ Optics’ tunable laser is designed to maintain high accuracy over a wide range of ambient temperatures. This makes it an ideal source for use in environments where the room temperature is not precisely controlled.

Unlike conventional sources that may require half an hour to warm up, the unique design of this source allows the device to achieve stable operation within seconds of being turned on. This saves time and effort for technicians in the field or on the production floor.

In DWDM applications, precise wavelength control is essential for obtaining accurate test measurements. With wavelength accuracy at the picometer level, the OZ tunable source is able to meet these demanding requirements. While the operating wavelength of most laser diodes is dependent on the current through the laser, the design of OZ Optics’ tunable laser will automatically compensate for changes in output power to restore the wavelength to its desired value.

DWDM applications for the metro marketplace require lasers operating at precise wavelengths in order to ensure that light intended for one channel does not interfere with adjacent channels. The precise wavelength control of the Intelligent Tunable Laser Diode Source allows one to replace an array of specific-wavelength sources with a single tunable source. By tuning the source, one can set the source to the specific channel required. OZ Optics also makes banks of 4 to 8 tunable laser modules for OEM applications. Each laser in a bank can be individually tuned to cover any of up to 10 channels (at 50 GHz spacing).

Not only does the Tunable Source offer accurate wavelength control, it also provides excellent power level control and stability. Power level accuracy is better than 1%, over a wide range of temperatures and wavelengths, with stability of better than 0.01 dB. With specifications like these, the Intelligent Tunable Laser Diode Source is well suited to countless applications where stability, accuracy, and reliability are required.

For more information on tunable laser diode products, contact OZ Optics.
### Bar Code | Part Number | Description
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20405 | TL-100-3A-1550-2-1-D | Intelligent Tunable Laser Diode Source with angled FC/APC connector, 1550nm center wavelength, ± 2 nm tuning range using a DFB laser, with 1 mW output power. Universal 110/220 volt AC/DC adapter with removable North American power cord included. (Other power cords are available separately. See below.)
4572 | GPIB-RS232 | RS232 to GPIB Adapter
4571 | GPIB-CABLE-2 | GPIB Cable, 2m long.
2736 | POWER CORD - UK | POWER CORD for UK
2737 | POWER CORD - EUROPE | POWER CORD for Europe
8122 | SMJ-3A3A-1300/1550-9/125-3-1 | 1 meter long, 3mm OD jacketed, 1300/1550nm 9/125 SM fiber patchcord, terminated with angled FC/PC connectors on both ends.

### Standard Product Specifications:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Center Wavelength</td>
<td>1550 nm</td>
</tr>
<tr>
<td>Wavelength Tuning Range</td>
<td>± 2 nm</td>
</tr>
<tr>
<td>Wavelength Accuracy</td>
<td>± 0.004 nm</td>
</tr>
<tr>
<td>Wavelength Resolution</td>
<td>0.001 nm</td>
</tr>
<tr>
<td>Wavelength Response Time</td>
<td>30 (typical) Seconds, from minimum wavelength to maximum wavelength.</td>
</tr>
<tr>
<td>Output Power</td>
<td>1 mW</td>
</tr>
<tr>
<td>Power Dynamic Range</td>
<td>20 dB</td>
</tr>
<tr>
<td>Power Stability</td>
<td>± 0.005 dB</td>
</tr>
<tr>
<td>Power Accuracy</td>
<td>5%</td>
</tr>
<tr>
<td>Power Resolution</td>
<td>0.001 dB</td>
</tr>
<tr>
<td>Power Response Time</td>
<td>2 (typical) Seconds, from minimum specified power to maximum specified power.</td>
</tr>
<tr>
<td>Connector</td>
<td>Angled FC/APC</td>
</tr>
<tr>
<td>Remote Communications Interface</td>
<td>RS232</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>120 to 240(@50 - 60 Hz) Volts. Universal AC/DC adaptor included.</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>15 to 35 °C</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>-30 to 60 °C</td>
</tr>
</tbody>
</table>
| Warm up time | 30 Seconds. Limited by slew rate of wavelength.  
15 Seconds to stable power. Limited by boot-up time |
| Dimensions | 60 x 90 x 190 mm, including protective boot. |
| Weight | 0.5 kg |
| Storage Humidity | <90% RH, non-condensing |
Bar Code | Part Number | Description
--- | --- | ---
20405 | TL-100-3A-1550-2-1-D | Intelligent Tunable Laser Diode Source with angled FC/APC connector, 1550nm center wavelength, ± 2 nm tuning range using a DFB laser, with 1 mW output power. Universal 110/220 volt AC/DC adapter with removable North American power cord included.
2737 | POWER CORD - EUROPE | POWER CORD for EUROPE
8122 | SMJ-3A3A-1300/1550-9/125-3-1 | 1 meter long, 3mm OD jacketed, 1300/1550nm 9/125 SM fiber patchcord, terminated with angled FC/PC connectors on both ends.

Questionnaire For Custom Parts:
1. What is the desired center wavelength?
2. What is the required tuning range?
3. What is the maximum power required?
4. What is the minimum power that you require?
5. What type of optical receptacle do you need on the source?
6. What type of laser diode do you need?

Ordering Information for Custom Parts:

**Part Number**

TL-100-\(X\)-\(W\)-\(R\)-\(P\)-\(L\)

- \(X\): Output Connector Codes:
  - 3S=Super or Ultra NTT-FC/PC
  - 3A=Angled NTT-FC/PC
  - 8=AT&T-ST
  - SC=SC
  - SCA=Angled SC
  - LC=LC
  - LCA=Angled LC

- \(W\): Center Wavelength in nanometers:
  (Example: 1550 for 1550 nm)

- \(R\): Tuning Range in nanometers from the center wavelength:
  (Example: 1 for ± 1 nm range.)

- \(P\): Maximum Optical Power in milliwatts:
  (Example: 10 for 10 milliwatts.)

- \(L\): Type of Laser Diode:
  - F=Fabry-Perot
  - D=DFB (Recommended)

Ordering Examples for Custom Parts

A customer in North America needs to test the wavelength sensitivity of some DWDM components over the range of 1532 nm to 1536 nm, at a power level in the range of 500 microwatts to 5 milliwatts. He requires an angled FC connector on his source. He can meet these requirements with the following:

<table>
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<tr>
<th>Part Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>TL-100-3A-1534-2-5-D</td>
<td>Tunable Laser Diode Source with angled FC/APC connector, 1534 center wavelength, ± 2 nm tuning range, with 5 mW output power. Universal 110/220 volt AC/DC adapter with removable North American power cord included.</td>
</tr>
</tbody>
</table>
Frequently Asked Questions (FAQs)

Q: What is the difference between a Fabry-Perot laser and a DFB laser?
A: A Fabry-Perot laser may have multiple peaks in its spectrum, close to its center wavelength. When operated at low powers, some of these peaks may be comparable in amplitude to the central peak. These are related to mode hopping, in which the dominant peak jumps from one wavelength to another. At higher power levels, these peaks generally disappear. DFB lasers have a single, well defined peak throughout their operating range. Since there are fewer problems associated with DFB lasers, they are generally preferred over Fabry-Perot lasers when mode hopping or spectral purity is important. However, DFB lasers are somewhat more expensive than Fabry-Perot lasers.

Q: What type of connector should I use for best results?
A: OZ Optics generally recommends the use of angled connectors. Connectors with flat surfaces tend to reflect more light back towards the laser, which can lead to optical instability within the laser. Although the tunable lasers have built-in optical isolators to reduce the effects of backreflection, best results are obtained when the reflected light is minimized.

Q: What makes the OZ Optics tunable source better than other sources?
A: Most optical sources are calibrated at one specific temperature. Although they may have built-in temperature compensation circuitry, such compensation generally works best for temperatures close to the calibration temperature. The OZ optics devices are fully calibrated at many different operating temperatures and power levels so as to ensure the utmost in accuracy over a very wide temperature span.

Q: Doesn't the wavelength change if you change the output power of the laser diode?
A: Normally, the wavelength of a laser diode will change slightly if the current through the diode changes significantly. The novel control techniques that OZ Optics uses in its Tunable Laser Diode Source allow it to compensate for changes to the wavelength that would otherwise occur when the current through the laser diode is altered.