High Wavelength Stability of LDC501 Laser Drivers

Rev B. Revised Oct 2012

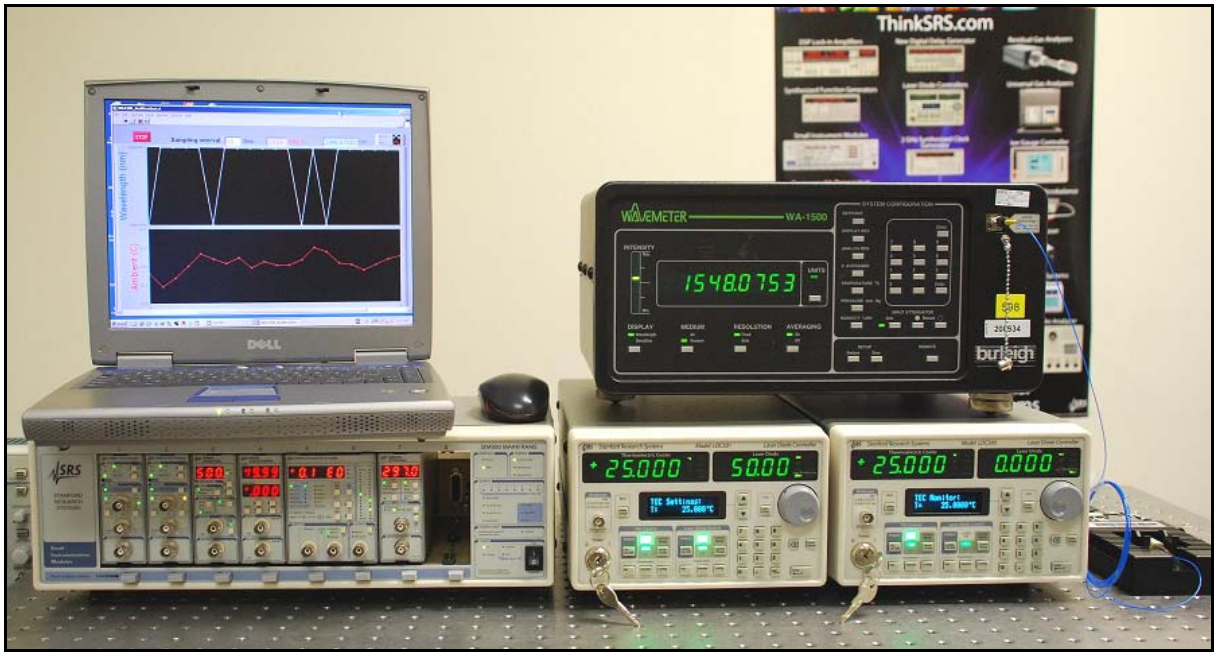

Figure 1 Wavelength drift test setup

LDC500 series laser diode controllers have highly stable TEC controllers and current sources. The laser current source shows <10ppm/°C drift, and the TEC temperature coefficient is <0.5mK/°C. This technical note illustrates the exceptional wavelength stability when they are used to control a diode laser.

Figure 1 shows the test setup. A butterfly laser is mounted onto a plate which is thermally stabilized by a LDC501 (right side) which is set at 25°C. A second LDC501 (middle) is used to control the butterfly TEC and diode laser and also drives the laser diode. The laser's optical output is fed to the WA-1500 wavelength meter.

The lab room temperature was monitored with a 100Ω platinum RTD, measured using a SIM923 monitor. The system was allowed to stabilize for one hour. And then wavelength data was taken every 10 seconds for 24 hours. The results are shown in Figure 2 on the next page.

It is shown that over a period of 24 hours, the lab room temperature (blue dots) varied between 22.5°C and 26°C, the laser wavelength (pink) changed ±0.15pm.

The second LDC501 (middle) was replaced with a competitor's laser diode controller, whose TEC controller loop gain was tuned as described in its instruction manual. The system was allowed to stabilize for one hour. And then wavelength data was taken every 10 seconds for 24 hours. The test result is also shown Figure 3 on the next page.

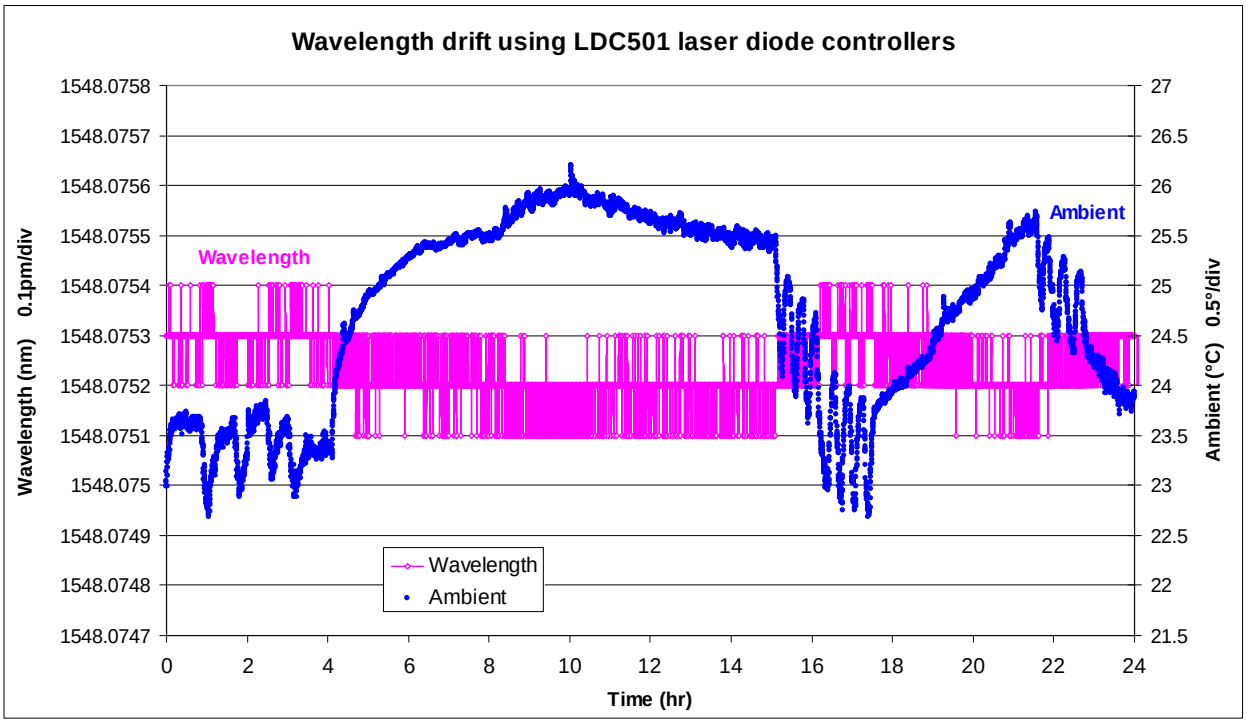

Figure 2 Overnight wavelength drift of a butterfly laser controlled with a LDC501

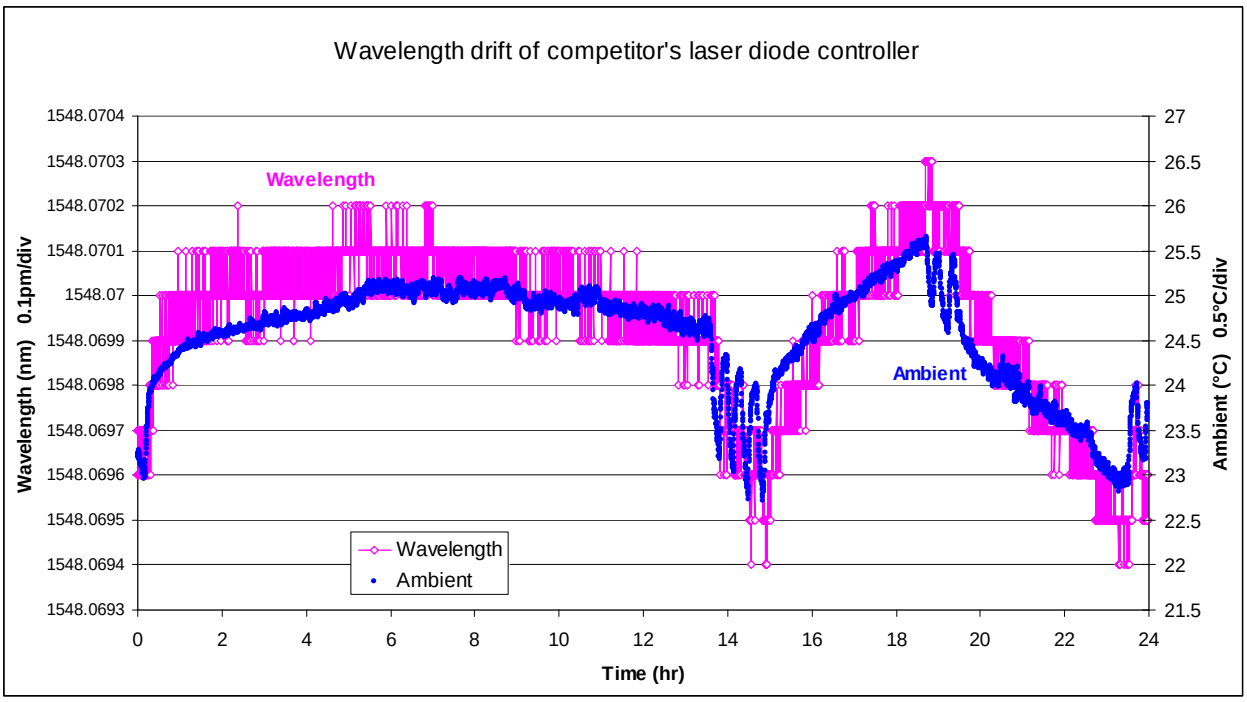

Figure 3 Overnight wavelength drift of a butterfly laser controlled with competitor's model

Figure 3 shows the competitor's wavelength drift test result. Over a period of 24 hours, the lab room temperature (blue dots) varied between 22.5°C and 26°C, the laser wavelength (pink) changed ±0.45pm, which is 3 times worse than LDC501.