

OVERVIEW

This technical note illustrates the temperature control stability of the LDT-5980 High Power Thermoelectric Temperature Controller.

TEST SET UP

A LDT-5980 was connected to the TE-550 Case Temperature Control of an LDM-4984 Butterfly Laser Diode Mount. An aluminum test load with two adjacent calibrated thermistors was clamped to the mounting pad of the LDM-4984.

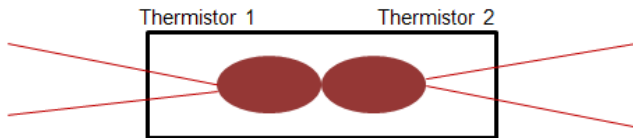


Figure 1: An internal view of the test load that shows the adjacent thermistors encased in the aluminum test load.

Thermistor 1 was used as the temperature control feedback to the LDT-5980 and Thermistor 2 measured the temperature stability of the aluminum test load with a Hewlett Packard 3458A 8 ½ Digit Multimeter.

The test load was covered with the LDM-4984's accompanying ESD protective cover to minimize air flow. To further insulate the test load, foam encompassed the ESD protective cover.

The test setup is shown in Figure 2.

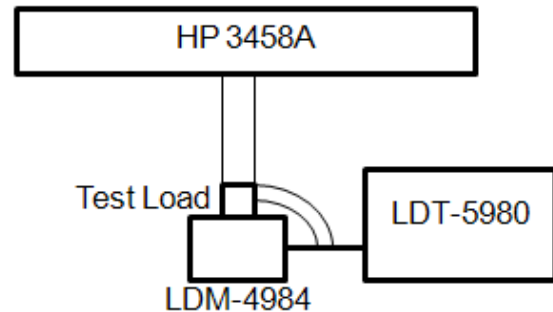


Figure 2: The temperature stability test setup.

A third calibrated thermistor, Thermistor 3, was placed near the test load to record the environmental temperature stability, which was measured with an Agilent 34401A 6 ½ Digit Multimeter.

TEST PROCEDURE

The resistances of Thermistor 2 and Thermistor 3 were measured every sixty seconds for 25 hours. Recording data for 25 hours shows the initial warm up period and the 24 hour stability data. The resistance data was converted to temperature data using the specified Steinhart-Hart constants for each thermistor. The temperature stability was calculated by subtracting each temperature measurement from the average temperature of the second hour.

RESULTS

A graph of the temperature stability of the LDT-5980 is displayed in Figure 3. The affect of the recommended one hour warm-up period on the temperature stability of the LDT-5980 is clear in the graph below. The instrument was within its published specification for long term temperature stability after 50 minutes, but did not reach its optimum stability for 56 minutes after power-up.

TECH NOTE

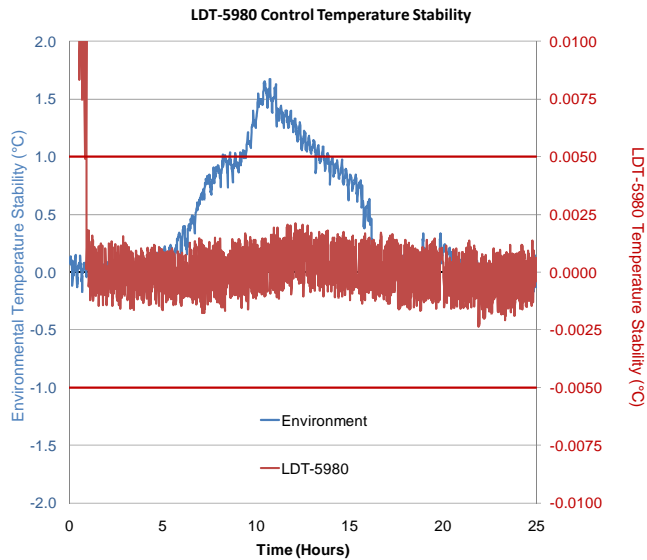


Figure 3: The temperature stability of the LDT-5980.

During the course of the test, the room temperature peaked at 1.618°C above the average. The instability of the environmental temperature in the lab was caused by the change in power status of the building during the day and night.

The instability of the room temperature had minor affects on the stability of aluminum test load controlled by the LDT-5980. The test load temperature had a peak of 0.00209°C above the average and -0.00245°C below the average.

CONCLUSION

The LDT-5980 High Power Thermoelectric Temperature Controller controlled the temperature of the test load to within $\pm 0.0025^{\circ}\text{C}$, which is well within the published specification for long term temperature stability. The long term temperature stability specification for the LDT-5980 is $\pm 0.005^{\circ}\text{C}$.