TECH NOTE

LRS-9434 Temperature Coefficient

OVERVIEW

The LRS9434 is designed to drive a stable current throughout a wide range of ambient temperature conditions. This tech note discusses the test done to verify stable operation despite multiple swings in the ambient temperature.

TEST SETUP

A calibrated LRS-9434 CMM was used with a TO-56 can, Type 1 laser fixture which was loaded with one characterized 1.989382 Ohm power resistor and 31 1N4005 diodes. A calibrated Agilent 34401A DMM was connected across the terminals of the resistor and used to monitor the voltage drop, a calibrated Agilent 34970A was used to measure a 100 Ohm RTD temperature sensor placed outside the CMM. The fixture was placed in zone 1 of a calibrated LRS9434CMM, with zones 2,3 and 4 remaining open. The CMM was located in a room in which the ambient temperature was set to 21C ±4C. Two 100 hour tests were then ran, one test with a set point of 50mA and the other with a set point of 450mA. Both had a temperature set point of 70C.

TEST PROCEDURE

First the power resistor needed to be characterized, this was done using two calibrated Agilent 34401A's, one set to current measurement and connected in series with the resistor and one set to voltage measurement and connected to the terminals of the resistor. An Agilent E3631A Triple Output power supply was used to supply power to the resistor, and the output was adjusted from 0.1A to 1.0A in 0.1A increments as read by the calibrated Agilent 34401A. At each set point the current and voltage were allowed to settle before the measurements were recorded. Once all of the data points had been taken, the resistance was calculated by using Ohm's Law at each set point and then the resistance was averaged across all of the set points.

Short wires were then soldered onto the power resistor which terminated in leads that fit into the TO56 pin sleeves.

The Agilent 34401A was monitored with Agilent Benchvue software and the 34970A was monitored with Agilent Benchlink software set to sample the RTD every minute. Once the test had completed, all of the data was compiled and the exact current through the resistor was calculated by Ohm's Law and averaged across one minute.

Data collection for both tests began after one hour of running.

RESULTS

FIGURE 1 shows the calculated current in blue and measured temperature in red across the entire 50mA, 100 hour test period.

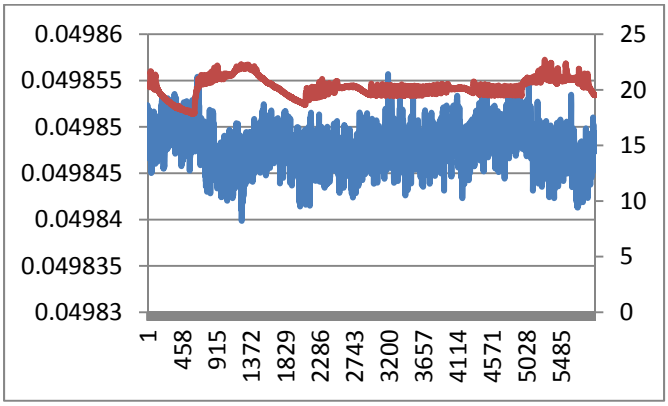

FIGURE 1

During the test, the temperature swung from a minimum of 17.843C up to a maximum of 22.692C, while the current swung from a minimum

of 49.840mA up to a maximum of 49.856mA. However, the minimum and maximum for the current did not coincide with the minimum and maximum of the temperature, FIGURE 2 shows when the current is graphed with respect to temperature and an R squared value is calculated, there is little correlation between the two.

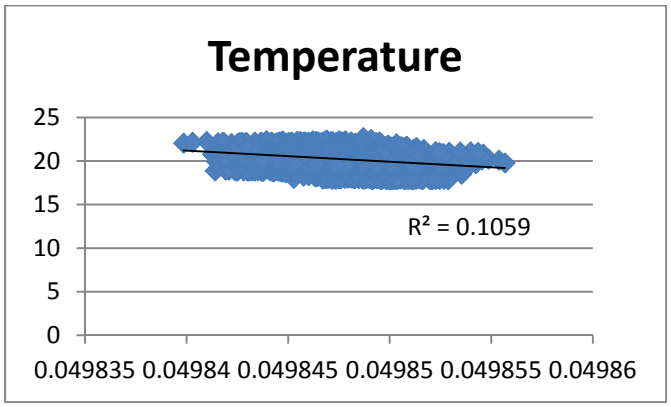

FIGURE 2

FIGURE 3 shows the calculated current in blue and measured temperature in red across the entire 450mA, 100 hour test period.

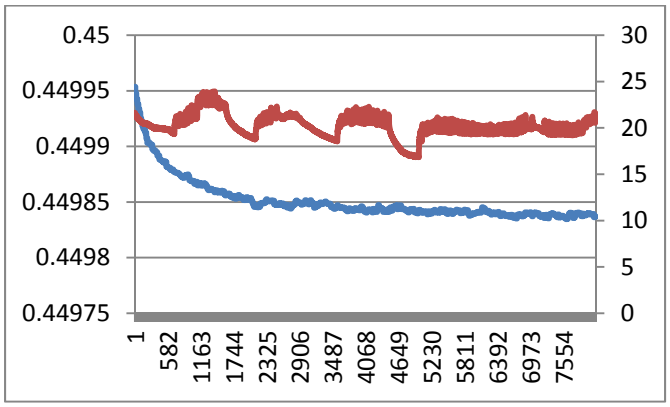

FIGURE 3

During the test, the ambient temperature varied from a minimum of 16.839C up to a maximum of 23.925C, while the current varied from a minimum of 449.835mA up to a maximum of 449.953mA. Once again, the minimum and maximum of the current did not coincide with the minimum and maximum of the temperature. FIGURE 4 shows when the current is graphed respect to temperature and R squared value is calculated, there is almost no correlation between the two.

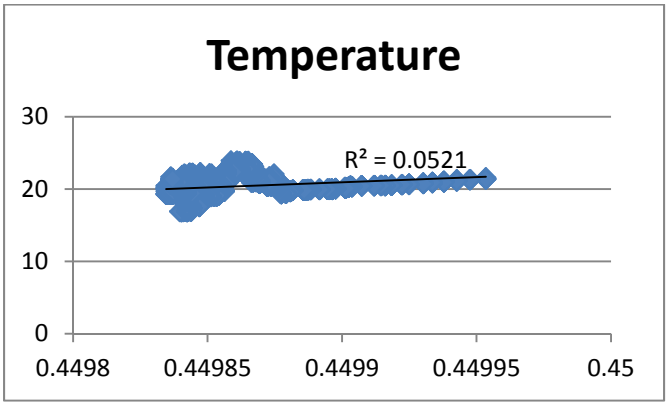

FIGURE 4

CONCLUSION

While operating within the suggesting temperature range of 23C ±5C, the LRS9434 maintains a constant current despite large swings in the ambient temperature