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| http://www.intersectionconsulting.com/wp-content/uploads/2011/03/UBC-logo.png  University of British Columbia Faculty of Applied Science Department of Electrical and Computer Engineering EECE 281 – Design Project I |
| DESIGN AND DEVELOPMENT OF |
| AUTOMATED REFLOW OVEN CONTROLLER |
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| Date of Submission: | Monday, February 24, 2014 | |
| Submitted to: | Dr. Jesús Calviño-Fraga, Ph.D. | |
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# Introduction

Reflow soldering is a common procedure utilized to attach surface mount devices (SMDs) into printed circuit boards (PCBs). Solder paste, a mixture of solder flux and pellets, temporarily secures the components into the board, which is then placed in the oven to melt. This method requires a strict control of time and temperature, allowing the solder to melt and permanently assemble components in great detail. The objective of this project is to design, build, program, and test a system controller that controls the process of reflow soldering.

User Specifications

Our reflow oven controller is capable of measuring PCB temperatures between 0°C and 280°C (to allow for an overshoot of temperatures above 250°C). There are four selectable reflow profile parameters included: soak temperature, soak time, reflow temperature, and reflow time. These parameters can either be selected from preset values or can be manually adjusted with switches SW8-SW0 and verified by the pushbutton KEY1. There are five reflow profile states: Ramp to Soak HEX7-HEX4 displays the total time while HEX3-HEX0 displays the elapsed time for each state.

Hardware Specifications

Our reflow oven controller is capable of measuring PCB temperatures between 0°C and 280°C (to allow for an overshoot of temperatures above 250°C). In order to measure the temperature inside the oven, a K-type thermocouple with cold junction compensation is used. The thermocouple outputs 41µV/°C. To amplify the excessively small output, it is connected to an OP07 OP-AMP. The resistors R1 and R2, which we used to wire the difference amplifier, are 20KΩ and 47Ω respectively (Talk about how we chose these to calculate our temperature range). The amplifier is then connected to

(Talk about how the SSR & PULSE WIDTH MODULATION WORKS..ASK OTHER PEOPLE). An NPN 2222A BJT is used to distribute a controlled signal of 5V to the SSR box from the pulse width modulation of the DE2 board.

# Investigation

This section includes the required subsections