

| Test Plan | | | | Note: Yes = Pass, No = Fail | |
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| Requirements | How to set up the test | What to test | Measurements | Results(Yes/No) | |
| This" third box" should be enclosed in some way | Start with everything connected and inside the third box | Is everything enclosed in the box? | | Yes | |
| All cable connections to the third box should have terminating connectors, securely mounted to the third box | Look at the wiring inside the third box | Do all the wires cleanly terminate (no excess/loose wires)? | | Yes | |
| Connectors should be the kind meant to be easily connected/disconnected by a casual user | Disconnect then reconnect each wire. | Are all of the wires easy to disconnect and connect? | | Yes | |
| Connectors should be the kind meant to be easily connected/disconnected by a casual user | Grab the thermometer sensor and attach it to the third box. | Was this able to done without any confusion? | | Yes | |
| Connectors should be the kind meant to be easily connected/disconnected by a casual user | Detach the thermometer sensor. | Is the sensor easy to connect and disconnect? | | Yes | |
| A thermometer sensor, at the end of a 2.0 +/-0.1 meter cable | Measure the length of the thermometer cable. | Is the cable 2.0 m. plus or minus .1 m.? | | Yes | |
| If the temperature sensor is not plugged into the third box, or is not working in some way, the display on the third box should notify the user that there is an error condition | Turn on the third box by flipping the switch and running the necessary software. Make sure the thermometer sensor is still detached. | Is there an indication that the sensor is detached (either all the LEDs are on or there is a seperate light indicating that the sensor is detached)? | | Yes | |
| In the lab, at room temperature, the output of the thermometer should be 22 degrees C, +/-4 degrees C | Attach the thermometer sensor to the box and hold down the button. Note: At this point make sure you are indoors where the temperature should be around room temperature. | Do the LEDs display 22 plus or minus 4 in binary? | 0011000: 24 C | Yes | |
| The correct temperature should appear on the LED display very soon when the button is pressed. (No noticeable delay). (delays are noticeable if they are longer than about 20 milliseconds) | | Did this happen without any noticeable delay (>20 ms)? | A little less than a second | No | |
| The button is to be "momentary contact": When pressed, the display is on, when not pressed, the display is off. The display should go dark when the button is released with no noticeable delay. | | Are all of the LEDs off? | | Yes | |
| | | Did this happen without any noticeable delay (>20 ms)? | A little less than a second | No | |
| | Stop pushing the button. | Did all of the components stay in the third box? | | Yes | |
| The box can be run upside down. | Take the third box and flip it upside down while still holding down the button. | Do the LEDs still display 22 plus or minus 4 in binary? | 0011000: 24 C | Yes | |
| When dropped to the floor with cables connected, the connectors or cables should not break (although it is OK if they become disconnected) | Drop the third box on the ground as though you accidently knocked it off a table. | Did anything break (it is fine if components are disconnected) ? | | Yes | |
| When someone holds the temperature sensor in their hand, the heat from their fingers should make the temperature go up after a few seconds. Holding a soldering iron close to or briefly touching the sensor should do the same, even more quickly. | While pushing the button, hold the thermometer sensor with your other hand or heat up in some way | Do the LEDs still display 22 plus or minus 4 in binary? | 0011000: 24 C | Yes | |
| | | Do the LEDs display a value that is greater than it was before (heats up)? | 0011100: 28 C | Yes | |
| | | While still pushing the button, toggle the switch to off. Are all of the LEDs off? | | Yes | |
| | | Did this happen without any noticeable delay (>20 ms)? | <20 ms | Yes | |
| When placed in a water-ice mixture, the output of the thermometer should be 0 degrees C, +/- 2 degrees C. | Turn the switch back to on, place the sensor in ice water, hold down the button. | Do the LEDs display 0 plus or minus 2 in binary? | 0000010: 2 | Yes | |
| The sensor should not be damaged when placed in ice water. | | Does the thermometer sensor stay undamaged? | | Yes | |
| When the computer is connected to the internet, and the switch on the third box is on, a graph of the past temperature readings from the third box can be displayed on the computer screen. Of data should be available within 10 seconds of the start of the software on the computer. The real time temperature, in degrees C or degrees F, (controlled by the computer user), is displayed prominently | Run the necessary software on the computer that reads the thermometer sensor data, displays the graph, and provides a control panel. Then look at the graph and control panel. | Does the software open and display the graph within 10 seconds? | 2.3 Seconds | Yes | |
| | | Is the temperature displayed prominently? | | Yes | |
| | | Is there an option that correctly changes the units from celsius to fahrenheit and vice versa? | | Yes | |
| Data updated once a second and matches the value on the LED display | Push and hold the button on the third box. | Is the temperature value in celsius on the computer updating with the temperature value displayed in binary by the LEDs? | | Yes | |
| The horizontal graph should correspond to and be labeled in "seconds ago from the current time". (this means the tic marks should be in the range 300->0) . The top of the graph corresponds to | | Are the initial bounds from 10 to 50 degrees celsius and 300 to 0 seconds ago? | | Yes | |
| | | Is the graph updating every second with new data? | about 1 sec | Yes | |

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| the graph corresponds to 50 degrees C, and the bottom, 10 degrees C. Temperature is updated once a second.). Older temperature values scroll off the graph on the left. | Look at the graph on the computer displaying the temperature readings. | Is the graph displaying the temperature in celsius for the last 300 seconds? | | Yes | |
| | | When a temperature reading is added, is it added to the right hand side of the graph and do the previous data scroll to the left? | | Yes | |
| The physical size of the graph should be scalable with the mouse. | Click the maximize button in the graph window or manually change the size of the graph box. | Does the size of the graph scales as the window gets bigger? | | Yes | |
| The physical size of the graph should be scalable with the mouse. | Click the magnifying glass icon on the graph (5th icon). Then left/normal click + drag a box around a subset of the graph. | Does the graph zoom into that box in the graph? | | Yes | |
| | | Does the graph zoom out to that box in the graph? | | Yes | |
| | | After a second does the graph reset to -10 to 63 degrees celsius and 300 to 0 seconds ago? | | Yes | |
| The physical size of the graph should be scalable with the mouse. | With the magnify glass still selected, right click + drag a box around a subset of the graph. Make sure to zoom further out than the range of the thermometer: (-10, 63) | Does the graph reset to the original bounds of 10 to 50 degrees celsius and 300 to 0 seconds ago? | | Yes | |
| | | | | | |
| The physical size of the graph should be scalable with the mouse. | Click the magnify glass icon on the graph (5th icon) again. Then left/normal click + drag a box around a subset of the graph. Click the four arrows icon on the graph (4th icon). Click on the graph and while holding the mouse down drag it around. | Does the focus area of the graph change (axis range changes)? | | Yes | |
| If the temperature sensor is unplugged from the third box, an "unplugged sensor" message should appear instead of the real time temperature. | Unplug the thermometer sensor. | Is "unplugged sensor" displayed instead of the temperature on the computer and is there the indication that the sensor is unplugged on the third box? | about 1 sec | Yes | |
| | | Is the "unplugged sensor" replaced with a temperature and does the indicator on the third box go away? | about 1 sec | Yes | |
| If the third box is off or the temperature sensor is not plugged in, the graph should continue to scroll and the graph data should be shown as missing. Missing data should be clearly discernable from data that is off-scale (too large or too small). When the error is corrected, the graphing and real time display of data should resume. | After 10-15 seconds plug the thermometer sensor back in. | Is it obvious that data was missing from the graph during the 10-15 seconds of the sensor being unplugged? | | Yes | |
| | | Does the graph continue to scroll to the left with the obvious missing data? | | Yes | |
| If the third box switch is off, a message "no data available" should appear instead of the real time temperature. | Toggle the switch to off on the third box. | Is "no data available" displayed instead of the temperature on the computer and does the third box turn off? | about 2 sec | Yes | |
| By user action on the computer, the LED temperature display on the third box can be turned on or turned off. (So, the computer can virtually "press the button" on the third box.) The button response time in this situation shall be less than 1 second. | With everything on, and plugged in, toggle the virtual button on the computer from off to on. | Do the LEDs display the binary value of the temperature in celsius within 1 second? | about 1 sec | Yes | |
| On if virtual button or actual button pressed | Push and hold the button on the third box. | Do the LEDs still display the binary value of the temperature in celsius? | | Yes | |
| On if virtual button or actual button pressed | While pushing the button on the third box toggle the button on the computer from on back to off. | Do the LEDs still display the binary value of the temperature in celsius? | | Yes | |
| Back to off when neither pressed | Stop pushing the button on the third box. | Do the LEDs turn off? | | Yes | |
| | | | | | |
| The two text messages, the max temperature, the min temperature, and the phone number can all be altered with the computer user interface. | On the computer, enter a max temperature, a min temperature, a phone number (without the one), a message that is sent when the temperature exceeds the max temperature, and a message that is sent when the temperature falls below the min temperature. The phone number needs to be registered with the software | Was it obvious which input boxes corresponded to these entries? | | Yes | |
| When the computer is on and the third box is on, a text message will be sent to a specified phone number whenever the real time temperature exceeds a certain value or is lower than a certain value. | Have the temperature sensor read a temperature that is above the set max or below the set min. If this is not possible with current materials, adjust the entered min or max to allow for a temperature reading that can fall out of the entered bounds. | When temperature goes below the min or above the max is a message texted to the number entered? | about 1 sec | Yes | |
| | | Is that message the corresponding message that you entered? | | Yes | |