

# **HW Wk 10 - Test Plan**

## **ECE 411**

### **Team #3:**

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Test Author: Kiryl Rabushka							
	Test Case Name:	Initial turn on				Test ID #:	0001
	Description:	This is a first initial turn on test to check if the power supply with a bare chip works. Here, we will test all voltage rails and voltage pins before loading data onto the chip. We will then switch to the programming state and flip the programming switch to see if our switch logic works.				Type:	<input checked="" type="checkbox"/> white box <input type="checkbox"/> black box <input type="checkbox"/> _____
Tester Information							
	Name of Tester:	Kiryl Rabushka				Date:	10/27/2023
	HW/SW Version:	HW: Rev 4, SW: None				Time:	13:30
	Setup:	Here we have an assembled board connected to the power supply at very low current. We also have a multimeter that we will use to probe the test points and voltage rails on the board before and after the LDO. We will also test if our rails reach where they need to. Ex. LCD, ATMEGA. The power supply was set to 3.3V and then tested again at 4.0V. Once that is done, we will connect an Arduino and use its pins to check if our logic with the programming switch works and does not connect 5V to other pins.					
STEP	Action	Expected Result	Pass	Fail	Not a	Comments	
1	Probe the input of LDO	3.3V input	✓				
2	Probe the output of LDO	3.3V output	✓			Output shows 3.3V	
3	Probe the input to the ATMEGA	3.3V	✓				
4	Connect the Arduino programming setup and test voltage rails	See no voltage on 3.3V rails. Only see 5V on the VCC of the chip.		✗		I saw about 4.3~4.6V on 3.3V voltage rails. That means something was sending voltage to the 3.3V LDO output line. I figured that the VCC was also connected internally to AVCC and AREF. Cut the leg of AVCC from ATMEGA because it had an internal connection to VCC	
5	Repeat actions from STEP 4	No voltage below 3.3V on the LDO line	✓			The voltage on the LDO line was still present, but was greatly lower. It went from 4.5V to 2.7V	
	Overall test result: At this point, it is fine that LDO has 2.7V because it is below the threshold to break any component on a 3.3V line. Overall, the board worked as expected with minor changes.		✓			We later found that VCC was also holding the reset line high because it was an (active) low pin. The reset line has a 3.3V connection to it through a 10k resistor.	

## Example Test Case

Test Author: Kiryl Rabushka							
	Test Case Name:	Final Test before case assembly				Test ID #:	0002
	Description:	This test is the final test before putting all the boards and wiring into the case. At this point, the board has soldered connections and does not use anything from the breadboard. We will test the functionality of all systems at this point. The board has the latest SW version 1.1.				Type:	<input type="checkbox"/> white box <input checked="" type="checkbox"/> black box <input type="checkbox"/> _____
Tester Information							
	Name of Tester:	Kiryl Rabushka				Date:	10/30/2023
	HW/SW Version:	HW: Rev 4, SW: Final Version 2.0				Time:	23:30
	Setup:	Multimeter, Battery attached to the PCB with LCD screen and Color Sensor					
STEP	Action	Expected Result	PASS	FAIL	N/A	Comments	
	1 Plug the battery into the slot battery slot	3.7V on the PCB +VCC before enable the switch	✓			3.3V before closed switch	
	2 Close the switch and measure the voltage on the input of LDO	3.7V on the LDO input		×		Saw about 0.3V on the LDO input. After some tinkering, the LDO blew up and released smoke. Had to cut the GND wire to stop further damage. I later found that during the final assembly, I put +3.3V LDO output attached to the SDA pin on the LCD board. I replaced the pins how they should be.	
	3 Repeat STEP 2	3.7V on the LDO input	✓				
	4 Test voltages and observe the LCD and color sensor behaviors	3.3V on the output LCD turns on and displays a smiley face Color sensor LED off during idle phase	✓				
	5 Put a color paper in front of the color sensor and press the button to ask for the color sensing state	Color sensor LED turns on Display the HEX color data on the LCD	✓			Verified the HEX data values with an online translator, and it showed the correct color values	
		Overall test result: Pre-assembly worked and is ready to be put into the case		✓			

<b>Test Author: Jacob Louie</b>						
	<b>Test Case Name:</b>	The basic functionality of the color sensor	<b>Test ID #:</b>	0003		
	<b>Description:</b>	Testing the basic functionality of the color sensor isolated from the rest of the modules. Verify that it is seeing the correct values after calibration and that it works at 3.3V.	<b>Type:</b>	<input type="checkbox"/> white box <input checked="" type="checkbox"/> black box <input type="checkbox"/> _____		
<b>Tester Information</b>						
	<b>Name of Tester:</b>	Jacob Louie	<b>Date:</b>	12/28/2023		
	<b>HW/SW Version:</b>	HW: Rev 4, SW: First Version 1.0	<b>Time:</b>	5:30PM		
	<b>Setup:</b>	<i>Hook up display to Arduino Uno with I2C at 3.3V and 5V. Add calibration to the simple example project for the color sensor and see the output on the serial line.</i>				
<b>Test</b>	<b>Action</b>	<b>Expected Result</b>	<b>Pass</b>	<b>Fail</b>	<b>N/A</b>	<b>Comments</b>
1	Show RED	#FF0000	<input checked="" type="checkbox"/>			Wasn't exactly the expected values, but was almost the same visually when you looked up the hex color code.
2	Show Blue	#0000FF	<input checked="" type="checkbox"/>			Wasn't exactly the expected values, but was almost the same visually when you looked up the hex color code.
3	Show Green	#00FF00	<input checked="" type="checkbox"/>			Wasn't exactly the expected values, but was almost the same visually when you looked up the hex color code.
4	Show White	#FFFFFF	<input checked="" type="checkbox"/>			It is the exact same as expected because it's calibrated off of this color.
5	Show Black	#000000	<input checked="" type="checkbox"/>			It is the exact same as expected because it's calibrated off of this color.
6	Works the same at 3.3V as it does at 5V	Run the same test as above on both 3.3V and 5V, and we should get the same results.	<input checked="" type="checkbox"/>			Works the same on both voltages.
	<b>Overall test result:</b>		<input checked="" type="checkbox"/>			Getting good color results.

<b>Test Author: Jacob Louie</b>						
	<b>Test Case Name:</b>	The basic functionality of the OLED Display	<b>Test ID #:</b>	0004		
	<b>Description:</b>	Testing the basic functionality of the Display isolated from the rest of the modules. Verify that it is outputting text and works at 3.3V.	<b>Type:</b>	<input type="checkbox"/> white box <input checked="" type="checkbox"/> black box <input type="checkbox"/> _____		
<b>Tester Information</b>						
	<b>Name of Tester:</b>	Jacob Louie	<b>Date:</b>	10/28/2023		
	<b>HW/SW Version:</b>	HW: Rev 4, SW: First Version 1.0	<b>Time:</b>	6:30PM		
	<b>Setup:</b>	<i>Hook up display to Arduino Uno with I2C at 3.3V and 5V.</i>				
<b>Test</b>	<b>Action</b>	<b>Expected Result</b>	<b>Pass</b>	<b>Fail</b>	<b>N/A</b>	<b>Comments</b>
1	Display example project	See images for example project on display	<input checked="" type="checkbox"/>			Works how it should
2	Display text and number	See the test and numbers on the display	<input checked="" type="checkbox"/>			Works how it should
3	Refresh display with new text	See text 1 and then text 1 goes away and then text 2 is displayed	<input checked="" type="checkbox"/>			Works how it should
4	Works the same at 3.3V as it does at 5V	Run the same test as above on both 3.3V and 5V, and we should get the same results.	<input checked="" type="checkbox"/>			
	<b>Overall test result:</b>		<input checked="" type="checkbox"/>			Does what's expected.

<b>Test Author: Jacob Louie</b>						
	<b>Test Case Name:</b>	Test calibration state in code	<b>Test ID #:</b>		0005	
	<b>Description:</b>	Make sure the calibration is saving the values after the chip loses power. Verify that the chip will enter calibration mode when first programmed. Verify that the chip will enter calibration mode when holding down the color collection button. Verify that it will go to idle mode after calibration is complete.	<b>Type:</b>		<input checked="" type="checkbox"/> white box <input type="checkbox"/> black box <input type="checkbox"/> _____	
<b>Tester Information</b>						
	<b>Name of Tester:</b>	Jacob Louie	<b>Date:</b>		11/11/2023	
	<b>HW/SW Version:</b>	HW: Rev 4, SW: Final Version 2.0	<b>Time:</b>		5:00PM	
	<b>Setup:</b>	<i>When programming the chip, you need to make sure you erase the EEPROM so it has no calibration data saved.</i>				
<b>Test</b>	<b>Action</b>	<b>Expected Result</b>	<b>Pass</b>	<b>Fail</b>	<b>N/A</b>	<b>Comments</b>
1	Power on the device for the first time after an EEROM wipe.	Will enter calibration mode, and it will say that it's entering calibration mode on the OLED display.	<input checked="" type="checkbox"/>			Works how it should
2	Finish calibration	Should go to idle mode, OLED display will be blank.	<input checked="" type="checkbox"/>			Works how it should
3	After calibration, read some colors, power cycle the device, then read those same colors.	Will go straight to idle mode and display a "Hello :)". The color sensor will show the same results as before it was power cycled.	<input checked="" type="checkbox"/>			Works how it should
	<b>Overall test result:</b>		<input checked="" type="checkbox"/>			Does what's expected.

Test Author: Jacob Louie						
	Test Case Name:	Test idle state in code	Test ID #:		0006	
	Description:	Test that it should wait for button press while in idle mode and that debounce code works as it should.	Type:		✓ white box □ black box □ _____	
Tester Information						
	Name of Tester:	Jacob Louie	Date:		11/11/2023	
	HW/SW Version:	HW: Rev 4, SW: Final Version 2.0	Time:		5:30PM	
	Setup:	Program chip as usual. Calibrate the color sensor if not done already.				
Test	Action	Expected Result	Pass	Fail	N/A	Comments
1	Test debounce by increasing the debounce delay so it's noticeable that a button press isn't being registered. Press button for .5 seconds.	A very short button press should do nothing. Will stay in idle mode	✓			Works how it should
2	Make debounce delay what it should be (50). Press button for .5 seconds.	Will go into color sensing mode. Will display a new color value.	✓			Works how it should
3	Hold the button down for at least 10 seconds.	Will go into calibration mode. Will display "calibration..."	✓			Works how it should
	Overall test result:		✓			Does what's expected.

<b>Test Author: Jacob Louie</b>						
	<b>Test Case Name:</b>	Test color sensing state in code	<b>Test ID #:</b>	0007		
	<b>Description:</b>	Verify that it's getting new color values when it enters the color sensing state and that it goes to the idle state after it is done.	<b>Type:</b>	<input checked="" type="checkbox"/> white box <input type="checkbox"/> black box <input type="checkbox"/> _____		
<b>Tester Information</b>						
	<b>Name of Tester:</b>	Jacob Louie	<b>Date:</b>	11/11/2023		
	<b>HW/SW Version:</b>	HW: Rev 4, SW: Final Version 2.0	<b>Time:</b>	6:00PM		
	<b>Setup:</b>	<i>Program chip as usual. Calibrate the color sensor if not done already.</i>				
<b>Test</b>	<b>Action</b>	<b>Expected Result</b>	<b>Pass</b>	<b>Fail</b>	<b>N/A</b>	<b>Comments</b>
1	Press the button while trying to read the color red. Then Press the button again while trying to read the color blue.	The HEX value on the display should change, and it should show the blue HEX value on the display.	<input checked="" type="checkbox"/>			Works how it should
	<b>Overall test result:</b>		<input checked="" type="checkbox"/>			Does what's expected.



<b>Test Author:</b> Josue Tristan						
	<b>Test Case Name:</b>	Durability Test	<b>Test ID #:</b>	0008		
	<b>Description:</b>	To test the durability, ease of disassembly, and reassembly of the housing. This test ranges from table drops to each member attempting to assemble. Test the integrity after assembly/disassembly and note down any wear	<b>Type:</b>	<input type="checkbox"/> white box <input type="checkbox"/> black box <input checked="" type="checkbox"/> Other		
<b>Tester Information</b>						
	<b>Name of Testers:</b>	Josue Tristan	<b>Date:</b>	11/30/23		
	<b>HW/SW Version:</b>	Final Case Version 3.0	<b>Time:</b>	2:37PM		
	<b>Setup:</b>	Involves a table drop from 30 inches with 2.5 lb weight on it				
<b>T E S T</b>	<b>ACTIONS:</b>	<b>TESTING FOR:</b>	<b>P A S S</b>	<b>F A I L</b>	<b>N / A</b>	<b>Actual results</b>
1	Dropped from 30in (waist high)	Small dent/crack	✓			No damage
2	Reassemble the device	Any signs of wear and/or deform from the forces applied after assembling	✓			No signs of deform, still holds together
3	Disassemble the device	Any signs of wear and/or deform from the forces applied after disassembling	✓			No signs of wear/deform
4	Stress test: 2.5 lbs placed on top	Signs of wear and/or deform from heavy stress	✓			No signs of damage
	<b>Overall test result: It passed the benchmarks we sent</b>		✓			Performed very well in those testings