

# ECE 411 Product Design Specification

Team 14

Version 1.0

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## Test Case

Test Author: Team 14						
	Test Case Name:	PCB Soldering Testing and Open Circuit Verification			Test ID #:	PCB-SOLDER-01
	Description:	This test case focuses on verifying proper soldering of all PCB components, including resistors, capacitors, LEDs, and the SD card module. It ensures that all connections are free from open circuits, shorts, or improperly placed components. The test also includes steps to fix common issues such as flipped LEDs, poorly soldered components, or misaligned parts.			Type:	<input checked="" type="checkbox"/> white box <input type="checkbox"/> black box
Tester Information						
	Name of Tester:	Eisa Alsharifi			Date:	12/06/2024
	HW/SW Version:	1.0			Time:	1:10-5:15 pm
	Setup:	<i>Prepare a multimeter for continuity and voltage checks.</i> <i>Have a soldering station ready for rework.</i> <i>Connect a 9V battery to VBAT1 for power testing.</i>				
S T E P	Action	Expected Result	P A S S	F A I L	N / A	Comments
1	Inspect solder joints on resistors (R1–R3).	All joints are clean and have no cold soldering or bridging.	✓			Resoldered R2 due to a cold joint.
2	Inspect solder joints on capacitors (C1, C2).	Capacitors are soldered properly, with no open circuits or shorts.	✓			No issues detected.
3	Check LED polarities and solder joints.	LEDs (R1, G1, Y1) are soldered properly; cathodes are not flipped.		✓		Cathode of LED R1 was flipped, fixed and retested.

4	Resolder flipped LED (if detected).	LED lights up correctly when powered.	✓		Verified LED R1 functionality after rework.
5	Inspect SD card module soldering.	SD card pins are aligned and properly soldered with no open circuits.	✓		Pin alignment was off; resoldered successfully.
6	Check for open circuits with a multimeter.	All resistors and capacitors show proper continuity.	✓		Continuity verified for all components.
7	Test power delivery to the PCB.	5V output is stable, with no shorts causing excessive current draw.	✓		Measured stable 5V output from Arduino Nano.
8	Insert SD card and test initialization.	SD card initializes successfully, and data can be read.	✓		Initialization successful, SD card works as expected.
9	Verify signal continuity for LEDs.	Multimeter shows continuity from the Arduino Nano to the LEDs.	✓		All LED connections verified.
<b>Overall test result:</b>			✓		Successful assembly

## Matrix Test (for varying parameters)

Test Author: Team 14						
	Test Case Name:	PCB Testing and Component Verification	Test ID #:	PCB-TEST-01		
	Description:	This test case focuses on debugging the PCB build to ensure that all components are correctly soldered, powered, and function as intended. The test will verify the connections for power supply, LEDs, speakers, microSD card, and Arduino Nano integration.	Type:	<input type="checkbox"/> white box <input checked="" type="checkbox"/> black box		
Tester Information						
	Name of Tester:	Eisa Alsharifi	Date:	12/06/2024		
	HW/SW Version:	1.0	Time:	6:10-10:15 AM		
	Setup:	<ul style="list-style-type: none"> <li>Power the PCB with a <b>9V battery</b> via VBAT1.</li> <li>Connect a pre-programmed Arduino Nano.</li> <li>Ensure components (e.g., LEDs, speakers, microSD module) are properly soldered and connected.</li> <li>Use a multimeter and an oscilloscope for voltage and signal verification.</li> </ul>				
T E S T	INPUTS	EXPECTED OUTPUTS	P A S S	F A I L	N / A	Comments
1	Inspect all solder joints visually.	No cold solder joints, shorts, or bridges are visible.	✓			All look good
2	Power ON the PCB with 9V battery.	Verify <b>5V</b> and <b>3.3V</b> output at Arduino Nano pins.	✓			We indeed get <b>5V</b> and <b>3.3V</b>
3	Check VBAT1 voltage with multimeter.	VBAT1 shows ~9V from battery.			✓	Wasn't tested

4	Check voltage at each LED pin.	LED pins should show expected voltage (e.g., ~2V for forward voltage).		✓		We're not able to get any readings to any LED
5	Verify speaker connections (LS1, LS2).	Output terminals show audio signal when Arduino sends sound.		✓		We get no sound, not even noise
6	Test microSD card module functionality.	MicroSD is initialized, and files are accessible.		✓		The adapter is soldered improbably
7	Check throttle input (A0 pin).	Voltage changes as throttle sensor is adjusted.	✓			We can get readings from the throttle
8	Test ON/OFF touch sensor functionality.	LED toggles correctly between ON/OFF states.		✓		It is powered, but doesn't function properly
9	Test mode change touch sensor.	LEDs correctly indicate current track; audio switches accordingly.		✓		It is powered, but doesn't function properly
10	Adjust throttle to test volume control.	Speaker 1 volume adjusts with throttle input.		✓		The readings are a bit off to were we wanted it to be
	<b>Overall test result:</b>			✓		We'll fix all the issues and retest

Next testing will be on 12/10/2024 in the morning.