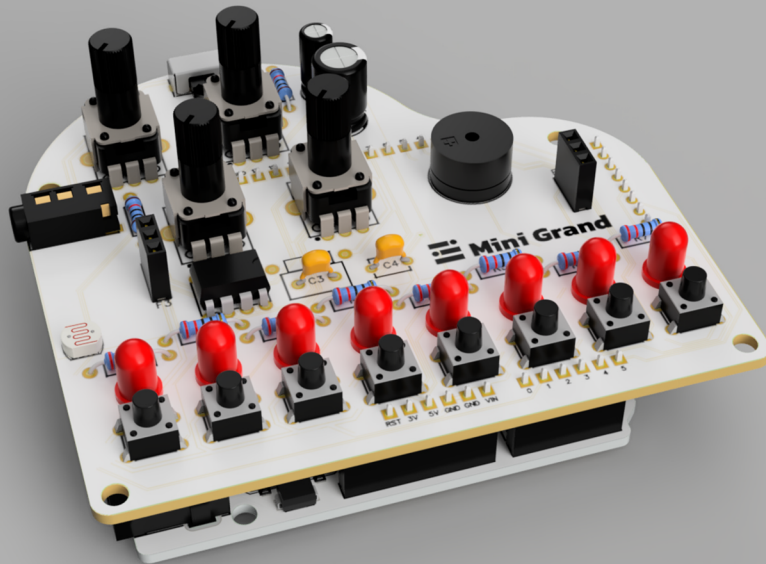


Mini Grand

DATASHEET **SKU : MG01V1S**



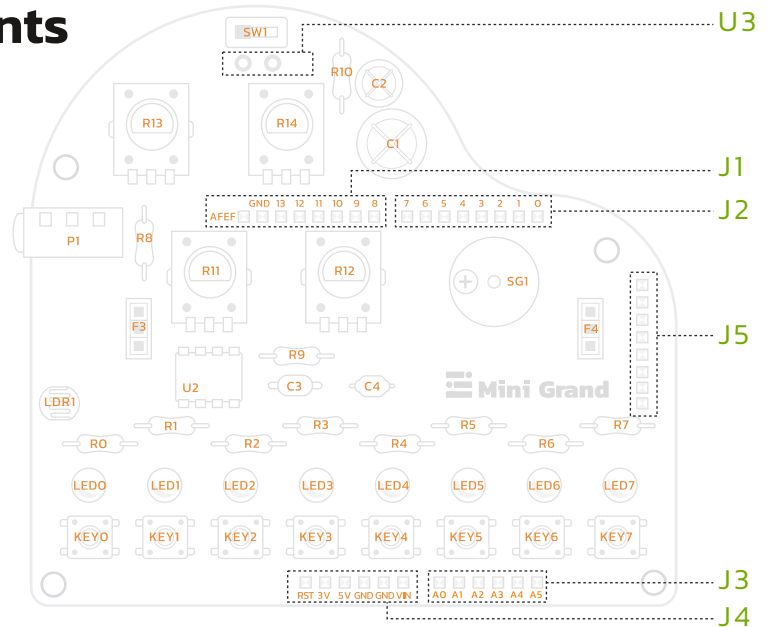
Description

The Mini Grand is a microcontroller shield designed for learners, hobbyists, and makers who are interested in creating their own musical instruments. It is a customizable gadget that can be programmed to function as various instruments, allowing users to unleash their creativity and explore new sounds.

The Mini Grand is specifically designed to connect directly to the amomii UNO and other Arduino UNO-style boards, making it easy to incorporate into existing projects. Additionally, assembling the Mini Grand is an excellent way to practice soldering skills, making it a great learning tool for beginners.













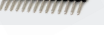
























Overall, the Mini Grand is a versatile and engaging DIY gadget that offers endless opportunities for customization and experimentation in the world of music-making.

Included Components

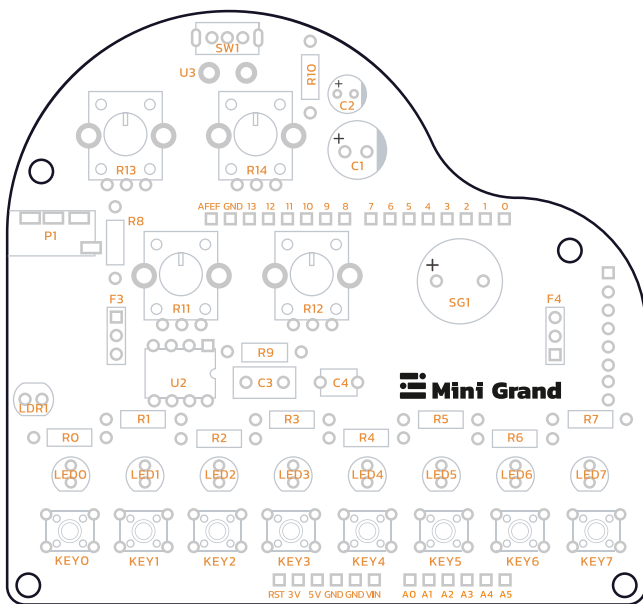


 Label on the upper side of the PCB

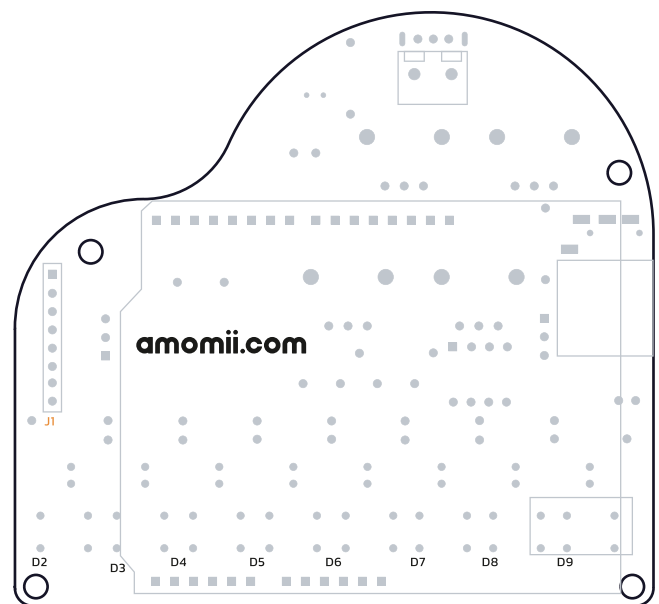
 Label on the under side of the PCB

| Image | Name | PCB Label | Datasheet |
|---|--------------------------------|--|---|
|  | Electrolytic Capacitor (220uF) | C1 |  |
|  | Electrolytic Capacitor (47uF) | C2 |  |
|  | Capacitor (47nF) | C3 |  |
|  | Capacitor (100nF) | C4 |  |
|  | Female Headers (3 Pin) | F3, F4 |  |
|  | Male Headers (40 Pin) | J1, J2, J3, J4, J5 |  |
|  | Photoresistor | LDR1 |  |
|  | Audio Jack (3.5mm) | P1 |  |
|  | Resistor (220Ω) | R0, R1, R2, R3, R4, R5, R6, R7 |  |
|  | Resistor (10KΩ) | R8 |  |
|  | Resistor (10Ω) | R9 |  |
|  | Resistor (100KΩ) | R10 |  |
|  | Potentiometer (10KΩ) | R11, R12, R13, R14 |  |
|  | BUZZER (Passive) | SG1 |  |
|  | Toggle Switch | SW1 |  |
|  | Audio Amp IC - LM386N-1 | U2 |  |
|  | Screw Terminal (2P) | U3 |  |
|  | Tactile Push Button | KEY0, KEY1, KEY2, KEY3, KEY4, KEY5, KEY6, KEY7 |  |
|  | LED (Red) | LED0, LED1, LED2, LED3, LED4, LED5, LED6, LED7 |  |

PCB Layout



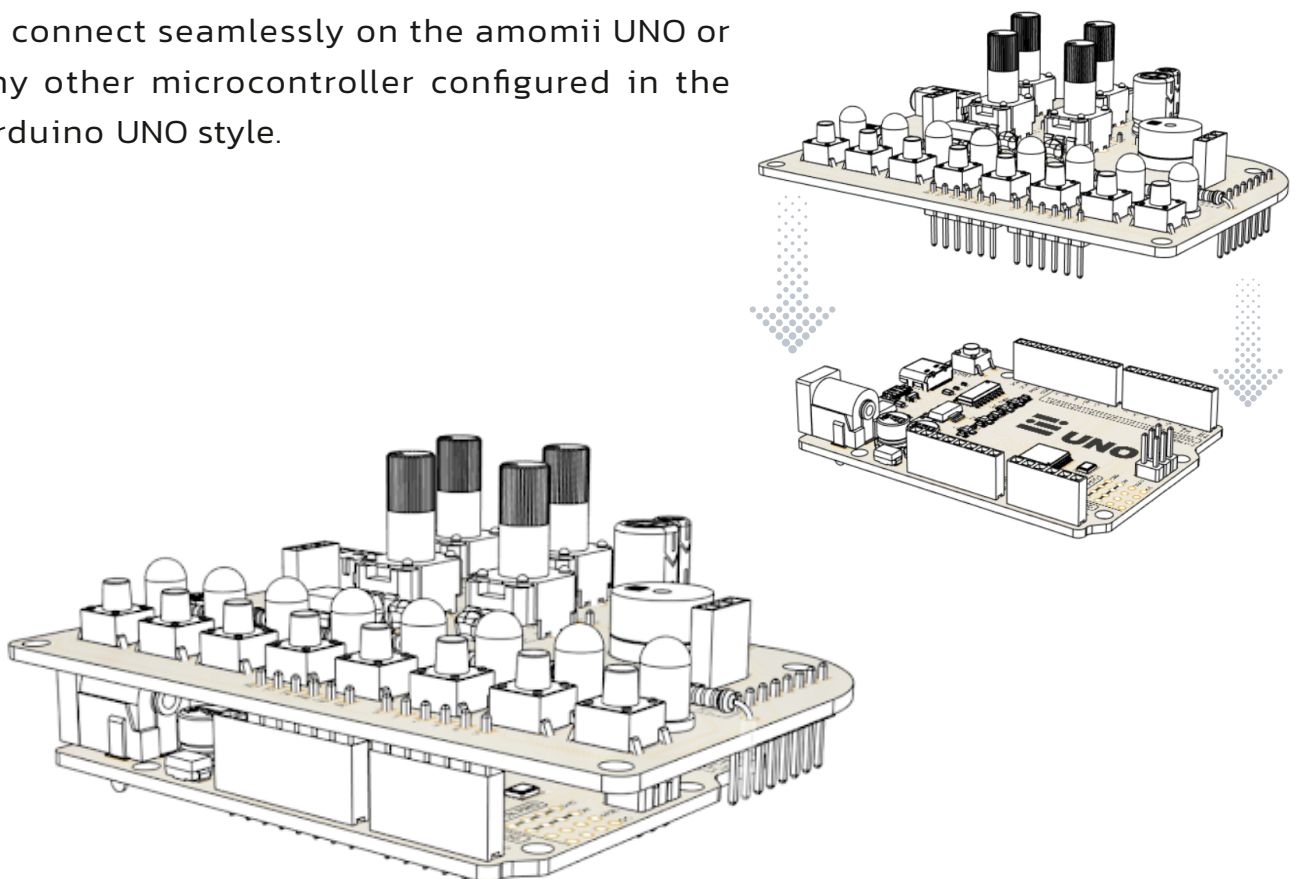
Top



Bottom

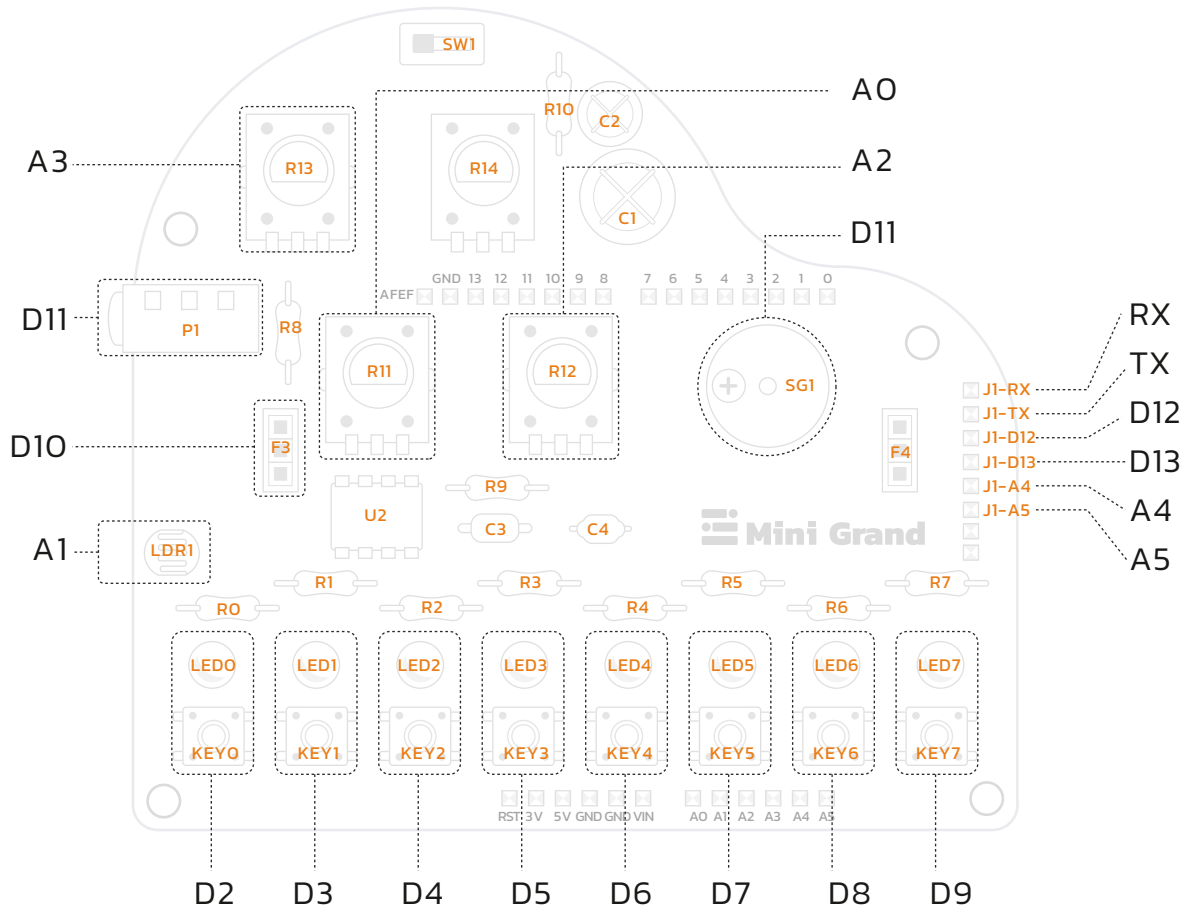
Microcontroller Connections

The Mini Grand shield is specifically designed to connect seamlessly on the amomii UNO or any other microcontroller configured in the Arduino UNO style.



Connection Diagram

The diagram below illustrates which UNO data pin each of the Mini Grand components are connected to.



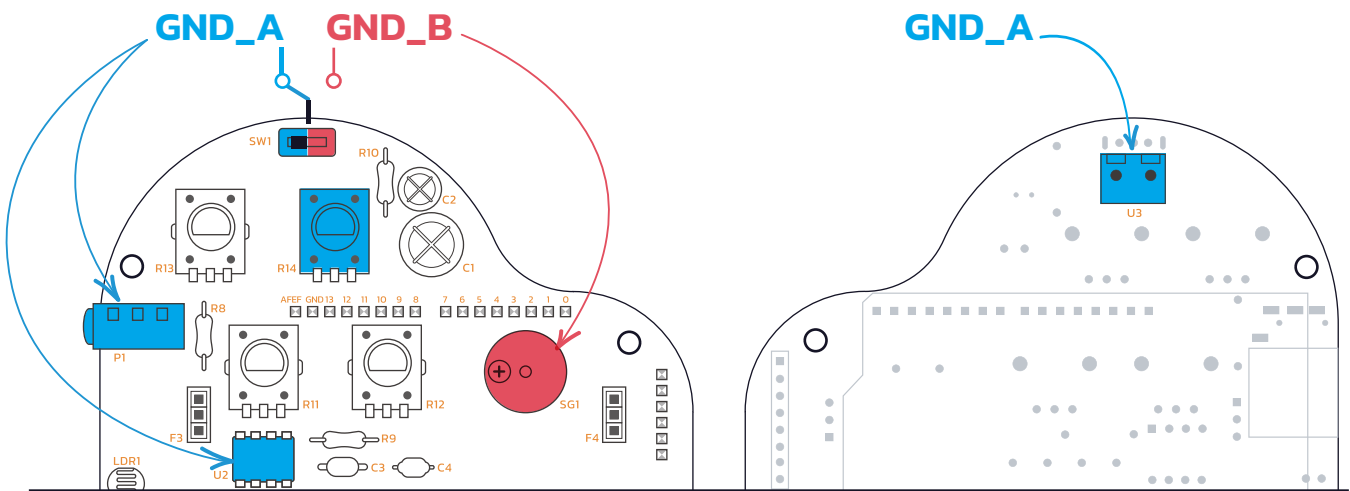
| PCB Label | UNO Data Pin | PCB Label | UNO Data Pin |
|------------|--------------|-----------|--------------|
| LED0, KEY0 | D2 | J1-RX | RX |
| LED1, KEY1 | D3 | J1-TX | TX |
| LED2, KEY2 | D4 | J1-D12 | D12 |
| LED3, KEY3 | D5 | J1-D13 | D13 |
| LED4, KEY4 | D6 | J1-A4 | A4 |
| LED5, KEY5 | D7 | J1-A5 | A5 |
| LED6, KEY6 | D8 | R11 | A0 |
| LED7, KEY7 | D9 | LDR1 | A1 |
| F3 | D10 | R12 | A2 |
| SG1, P1 | D11 | R13 | A3 |

Circuitry Details

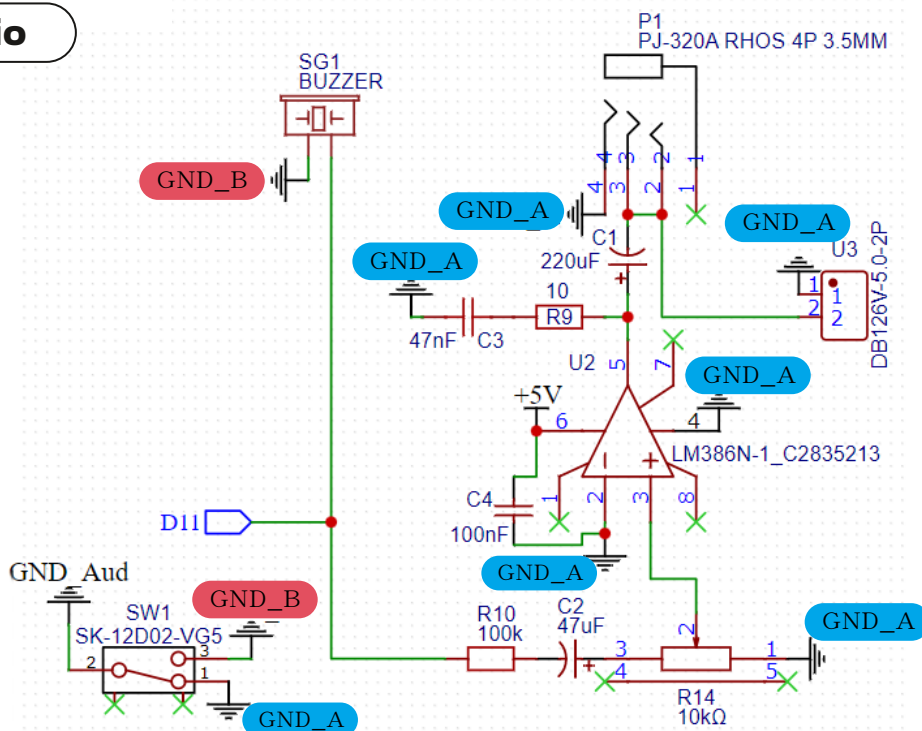
While some of the components are connected directly to the microcontroller in a conventional manner, others need more of an explanation.

Audio Output Devices and Connectors

The switch at the top of the board switches between connecting the 'Ground Group A' and 'Ground Group B' to the ground of the microcontroller and power supply, thus activating or deactivating the respective groups. Ground Group A is used by the audio output devices such as the amplifier IC, the speaker screw terminal, and the audio jack, whereas 'Ground Group B' is used by the buzzer. Thus, when a speaker is used via the audio output jack or the screw terminal, the buzzer is silenced, and vice versa.



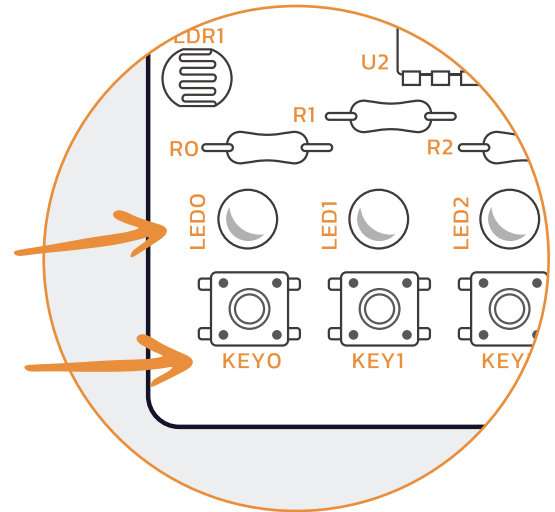
Audio



Keys and LEDs

The Mini Grand has 8 keys (tactile buttons) and 8 LEDs. Typically, these would be connected to the microcontroller directly; however, if we were to do this, 16 UNO data pins would be taken up leaving little room for other components. To combat this, we have wired it so that each key shares an UNO data pin with an LED. Thus, we only need to occupy 8 UNO data pins.

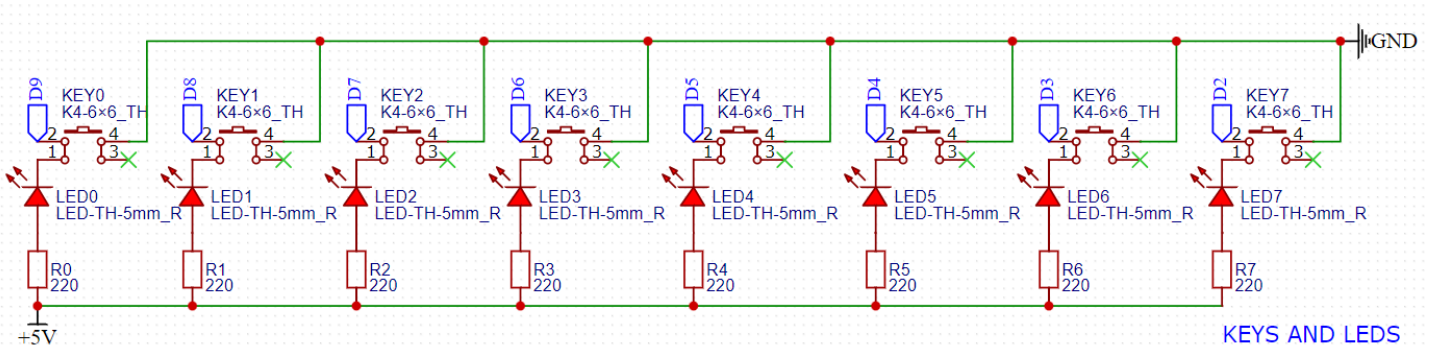
For example, both Key 0 and the LED above it are connected to the UNO's pin 9.



The circuit was designed in such a way that the keys can be used as normal tactile buttons connected to a microcontroller with the pin mode set to INPUT_PULLUP. In this configuration, each time a button is pressed, reading the pin with the digitalRead function will return a 0 and a 1 will be returned when the button isn't pressed. Moreover, each time the button is pressed, the corresponding LED will be turned on passively.

The LEDs can also be controlled actively (through code). To do this, users can simply set the pin mode to OUTPUT and write the pin HIGH or LOW using the digitalWrite function. The LED will turn on when written LOW and off when written HIGH (opposite to the behavior of an LED connected in a conventional manner).

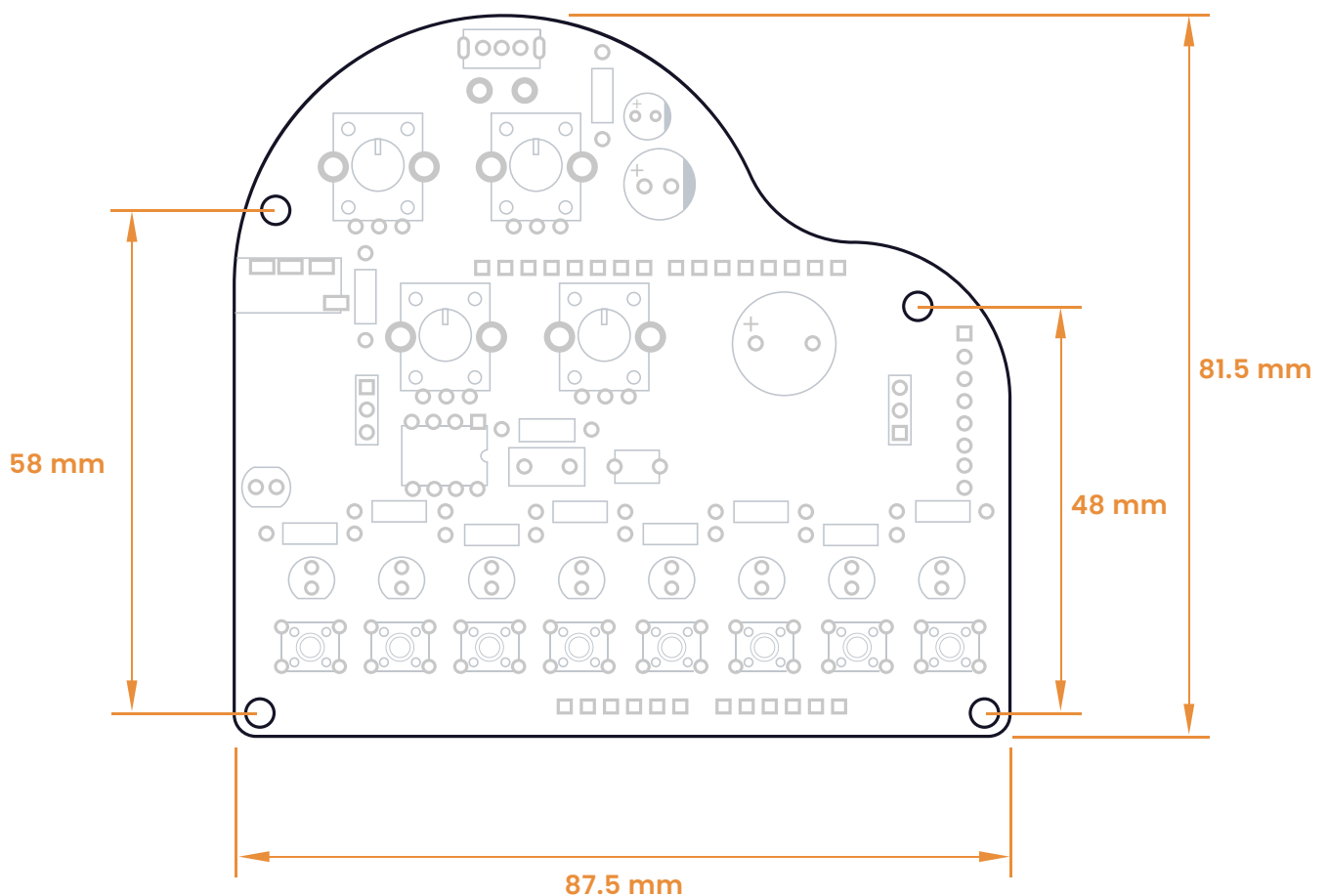
Keys and LEDs Schematic



Coding

The Mini Grand can be coded to “behave” and be used in a number of ways, but to get started, we suggest uploading some of the fully commented example codes provided by amomii. For more information on setting up the Mini Grand, refer to the Getting Started document.

Board Dimensions



Revision History

| Date | Revision | Changes |
|---------------|----------|---------------|
| FEB. 09. 2023 | 1 | First release |



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