

# Design

Depicts vaious design aspects associates with this project.

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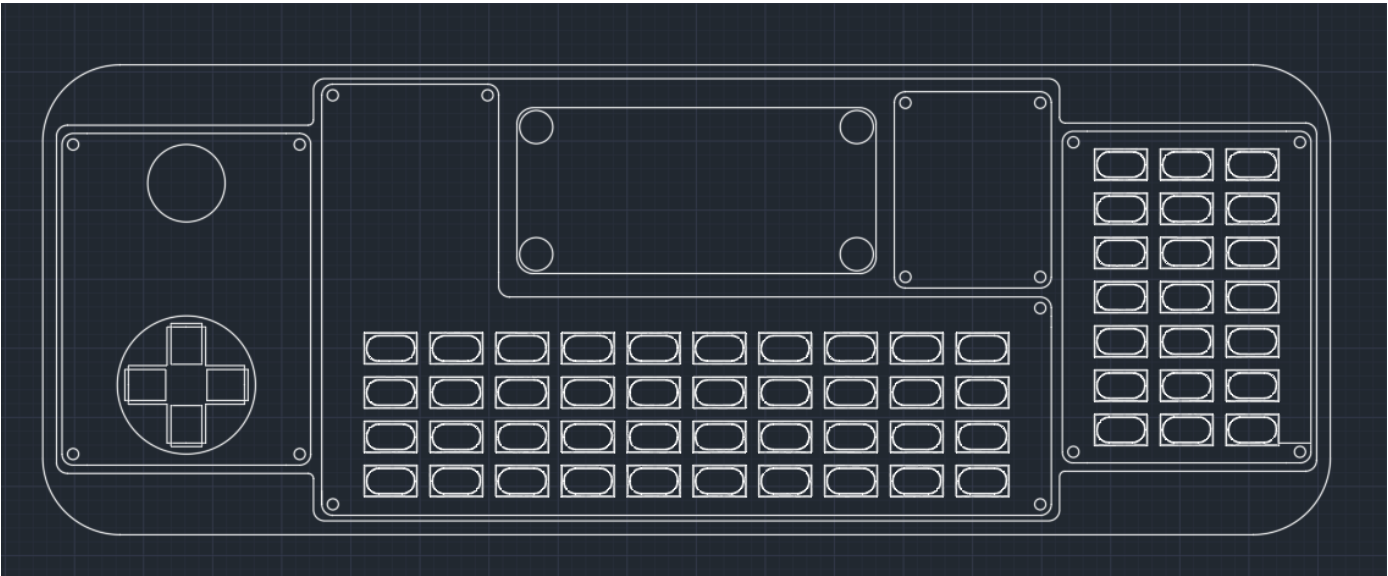
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## Case



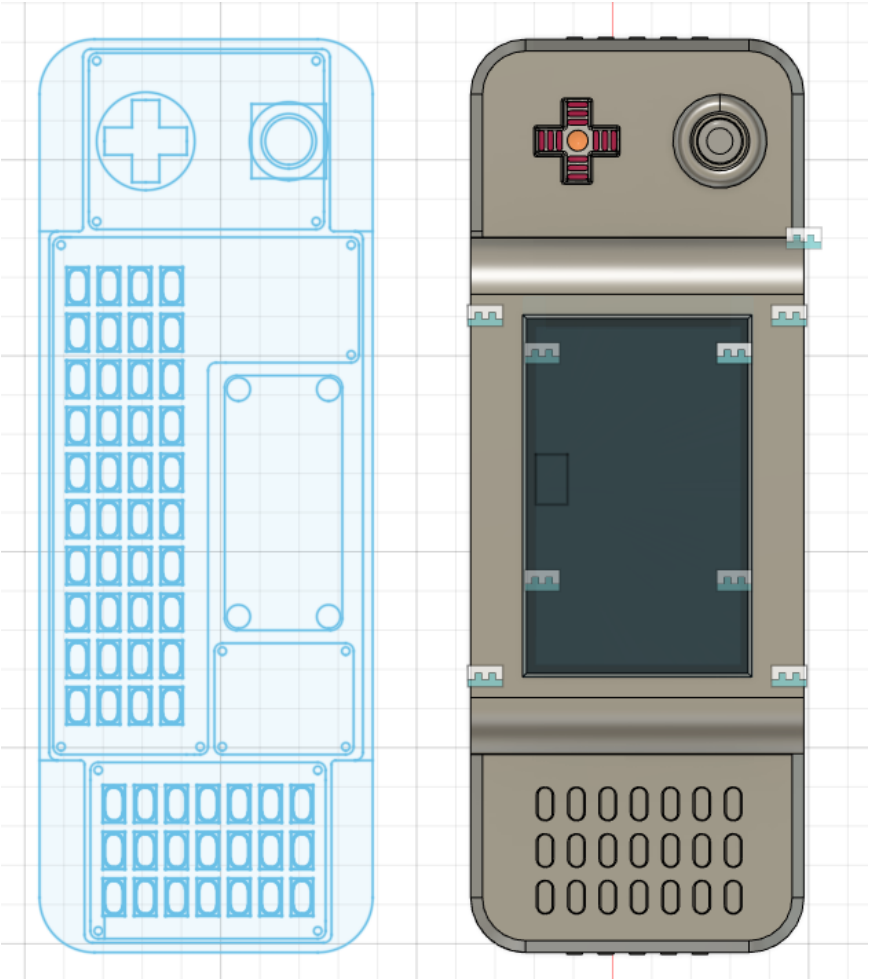
|:--😄 | *Rendering of Casing for Calculator.* |

## AutoCAD Drawings



|:--😬 | 2D Outline of Case in AutoCAD |

Mocked up in AutoCAD to determine layout, especially in regards to PCB orientation and configuration. Exported as a dxf, and utilized to build enclosure in Fusion360 from this initial sketching. All dimensions for the Fusion360 model determined from this initial sketch.

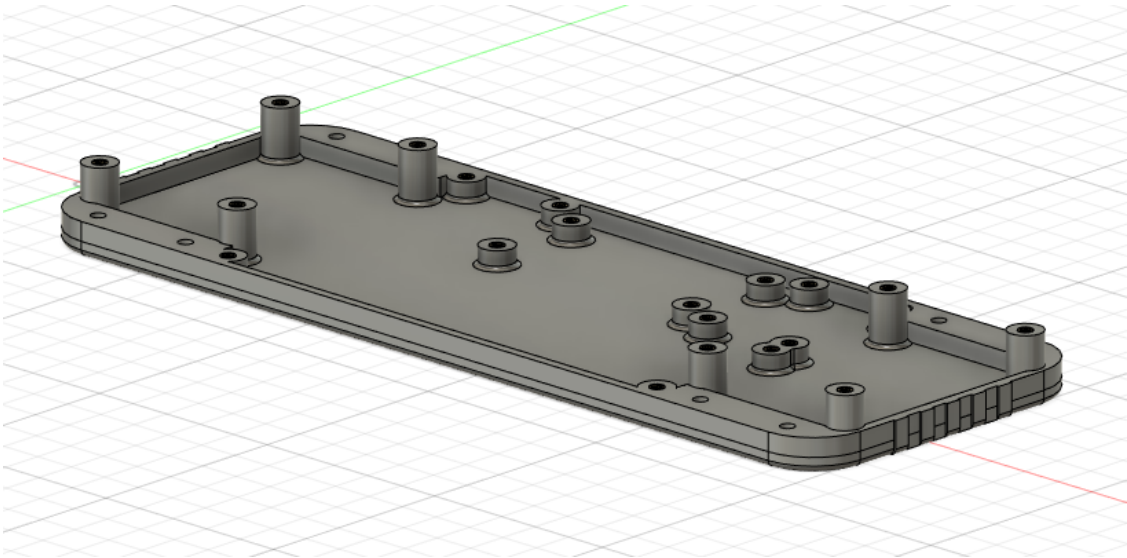


sketch, and the finalized model in Fusion360. |

|:--😬 | Comparision between the initial 2D AutoCAD

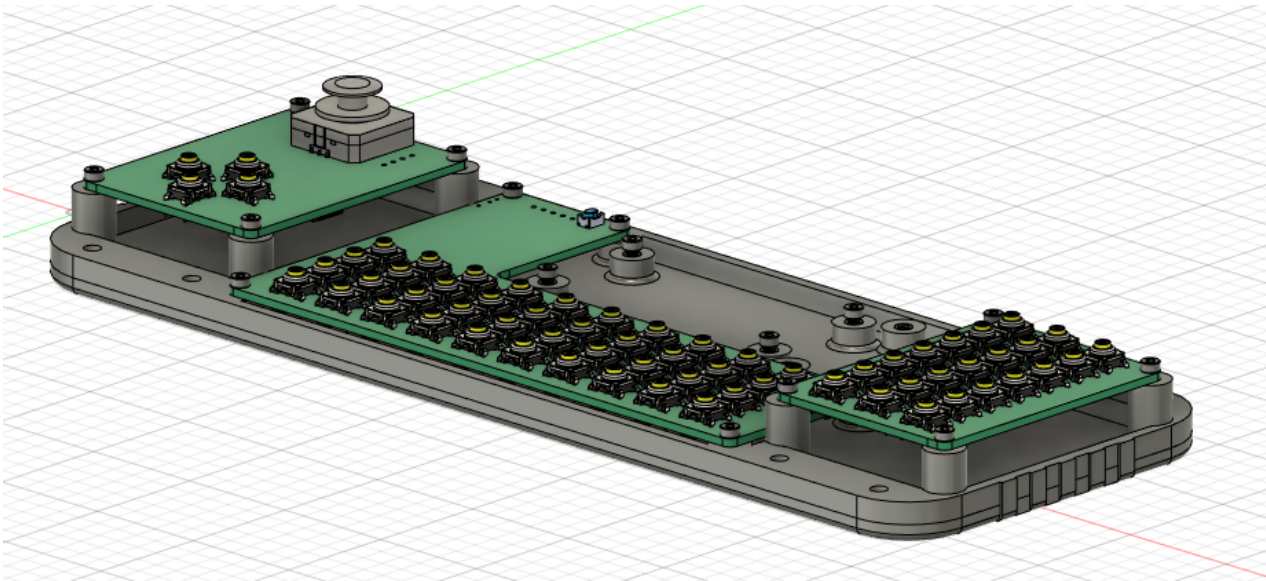
Fusion360 Models

Case Bottom



|:--😬| Bottom Case for

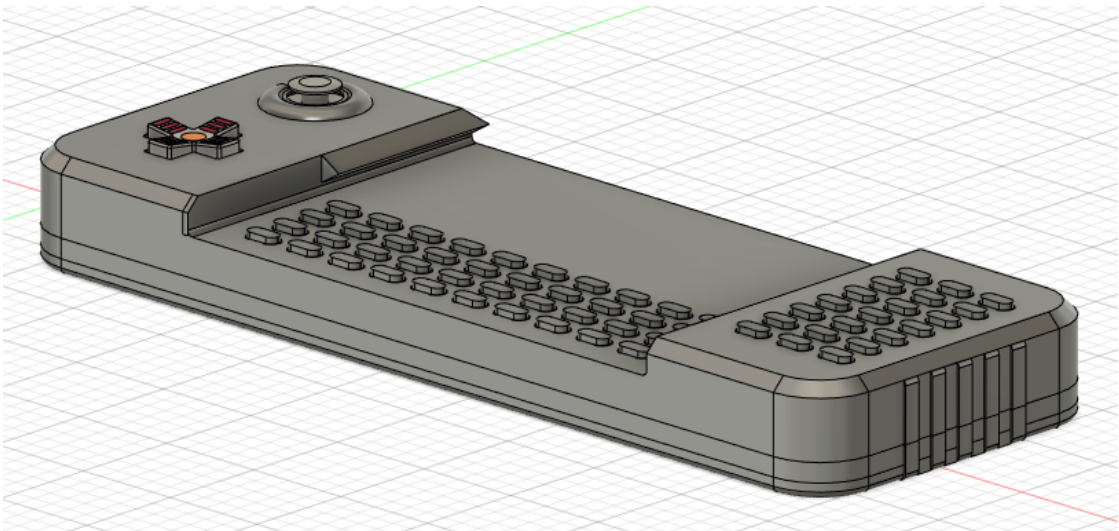
Calculator. |



|:--😬|

Bottom Case for Calculator with PCB's included. |

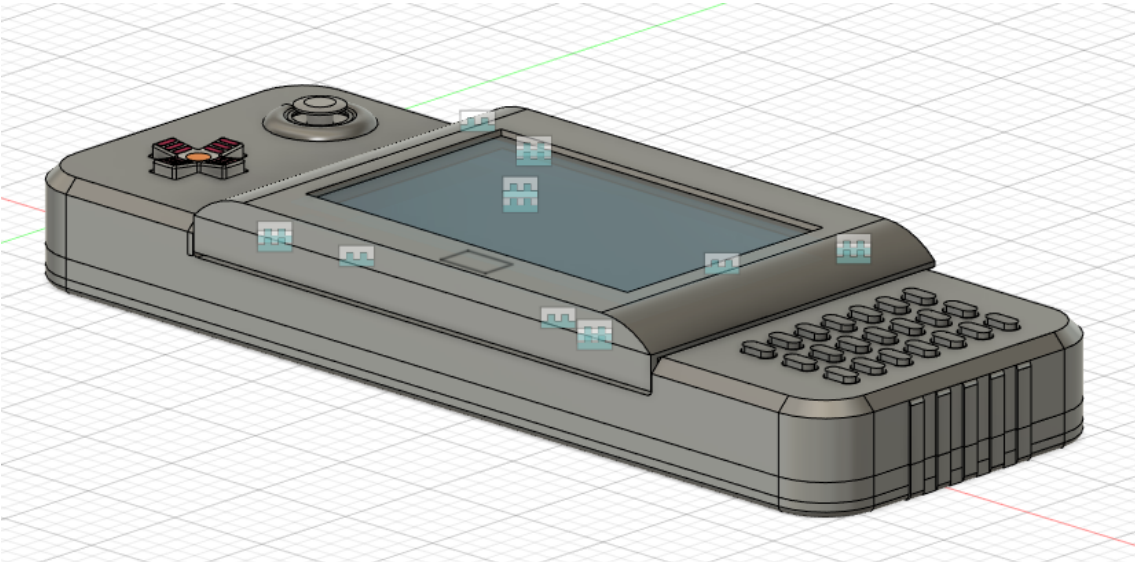
Case Top



|:--😬| Top Case for

Calculator. |

Case All



Calculator: | :-:😬 | Full Case Design for

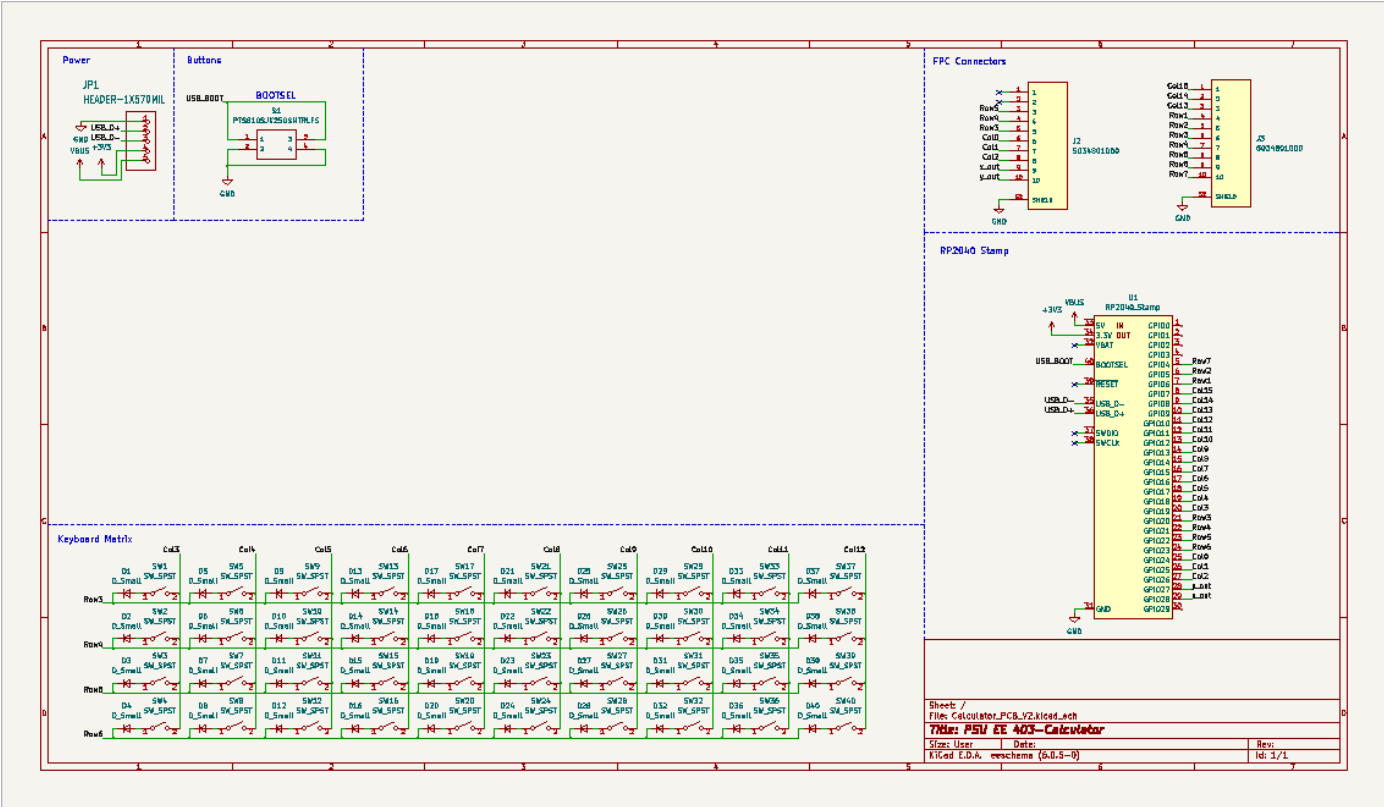
Case BOM

All casing produced and manufactured by PCBWay's Stereolithography (SLA) Printing Service<sup>^1</sup>. This SLA service allows for precise and accurate feature resolution. For this project, the material of choice was the standard white material (UTR 8360), providing great dimensions accuracy while also being durable. Pricing for each part of the enclosure is shown in the table below.

Component	Cost
Display Top	\$4.98
Display Bottom	\$8.46
Case Top	\$16.68
Case Bottom	\$17.42

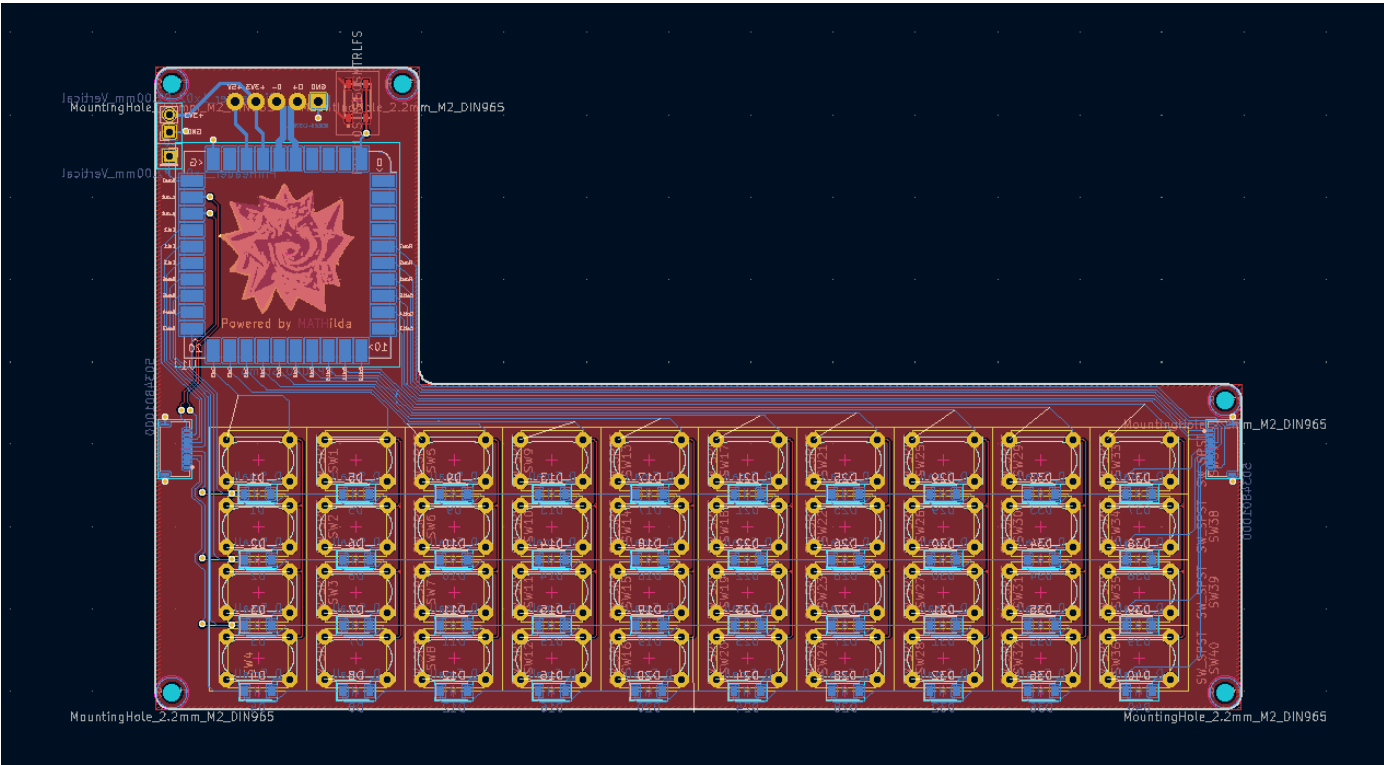
Keyboard Module

The keyboard module is responsible for alphabetical input from the user. This is handled by a full qwerty keyboard, in addition to other keys aswell.

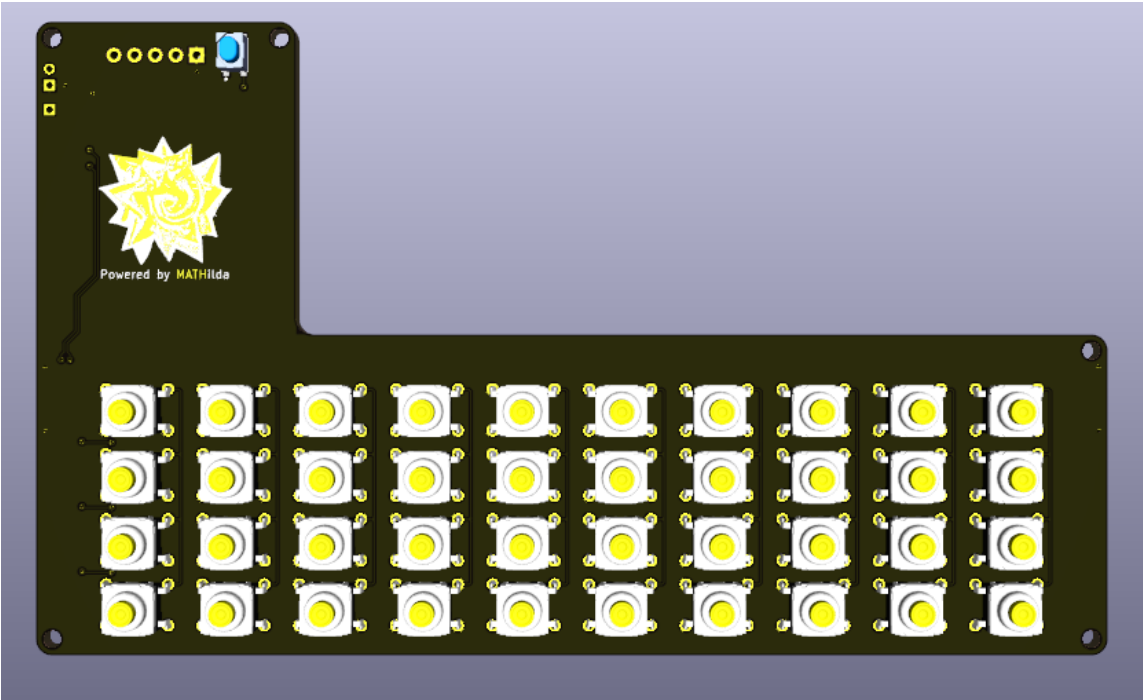


:-:😬 | Keyboard Module KiCAD Schematic. |





|:--😄 | Keyboard Module PCB Routing and Component Placement. |



Keyboard Module PCB. |

|:--😄 | 3D Render of

Keyboard BOM

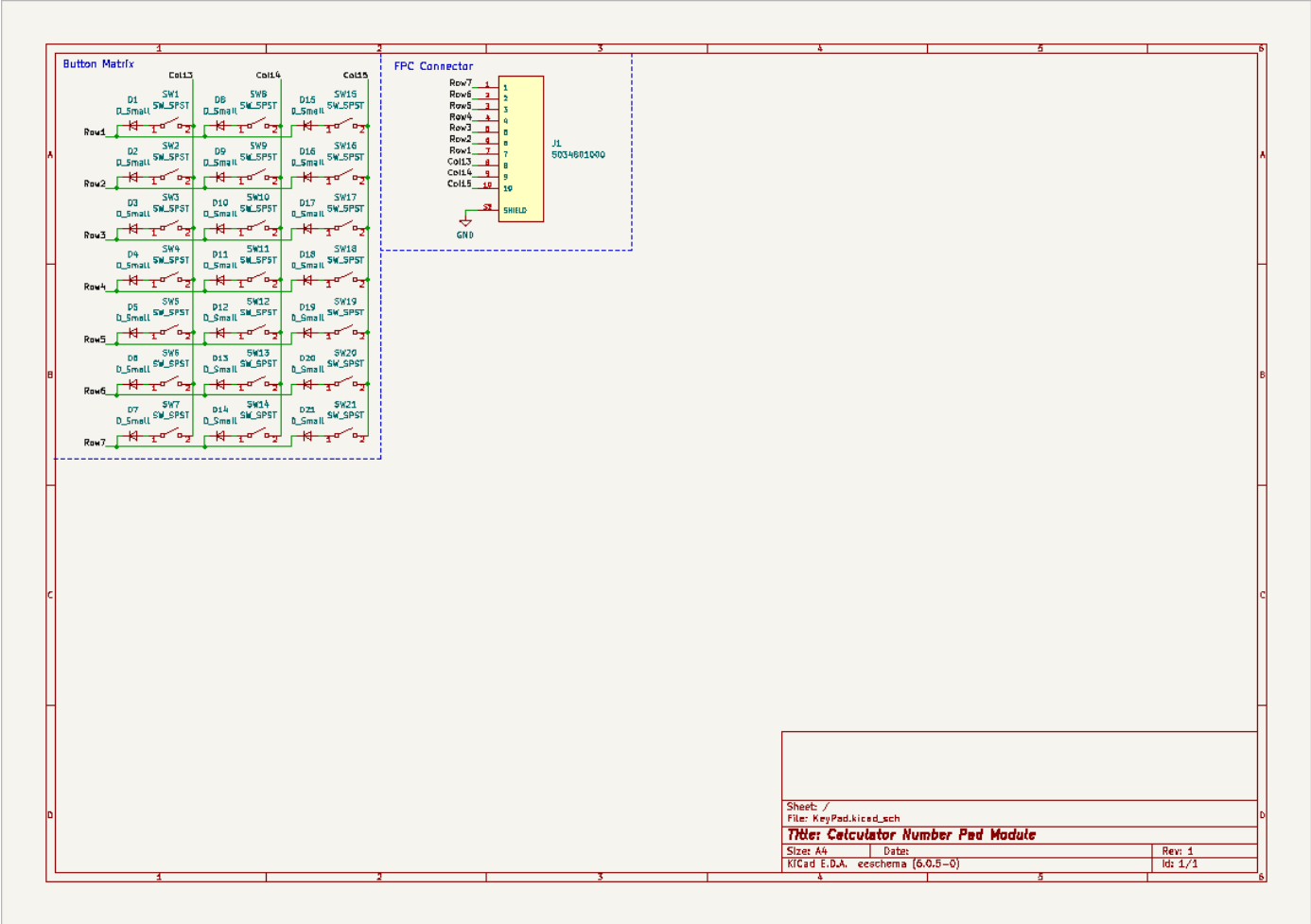
Keyboard module PCB manufactured by PCBway's PCB fabrication service. The following table details the components used within the module, along with information on pricing for the actual PCB.

Component	Cost	Link
RP2040 Stamp	\$12.00	<a href="https://www.tindie.com/products/arturo182/rp2040-stamp/">https://www.tindie.com/products/arturo182/rp2040-stamp/</a>
KSA1M331LFT SPST-NO	\$0.91	<a href="https://www.digikey.com/en/products/detail/c-k/KSA1M331LFT/1003897">https://www.digikey.com/en/products/detail/c-k/KSA1M331LFT/1003897</a>
Tactile Cap Oval (BLACK)	\$0.39	<a href="https://www.digikey.com/en/products/detail/c-k/BTNK0390/559405">https://www.digikey.com/en/products/detail/c-k/BTNK0390/559405</a>
FPC 10Pin Connector	\$1.13	<a href="https://www.digikey.com/en/products/detail/molex/5034801000/2356624">https://www.digikey.com/en/products/detail/molex/5034801000/2356624</a>
FPC 10Pin Cable	\$3.74	<a href="https://www.digikey.com/en/products/detail/molex/0152660095/3160830">https://www.digikey.com/en/products/detail/molex/0152660095/3160830</a>
1N4148WTPMSCT-ND Diode	\$0.03816	<a href="https://www.digikey.com/en/products/detail/micro-commercial-co/1N4148W-TP/717196">https://www.digikey.com/en/products/detail/micro-commercial-co/1N4148W-TP/717196</a>

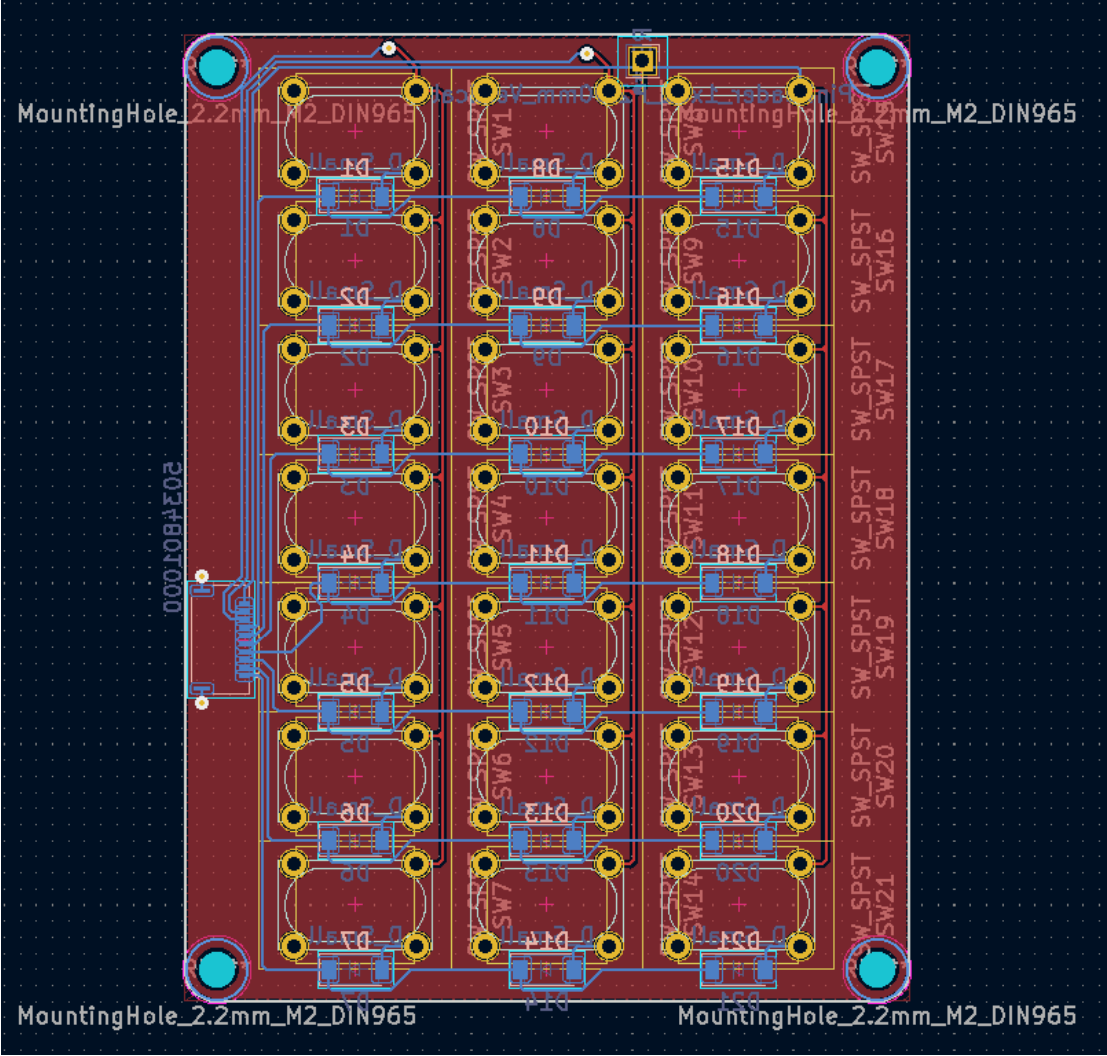
Component	Cost	Link
PTS810SJK250SMTRLFS	\$0.36	<a href="https://www.mouser.com/ProductDetail/611-PTS810SJK250SMTR">https://www.mouser.com/ProductDetail/611-PTS810SJK250SMTR</a>
Keyboard Module PCB	\$51.58	

## NumPad Module

The numpad module is responsible for numerical input, as well as mathematical operations. This is handled by a 7x3 button matrix.

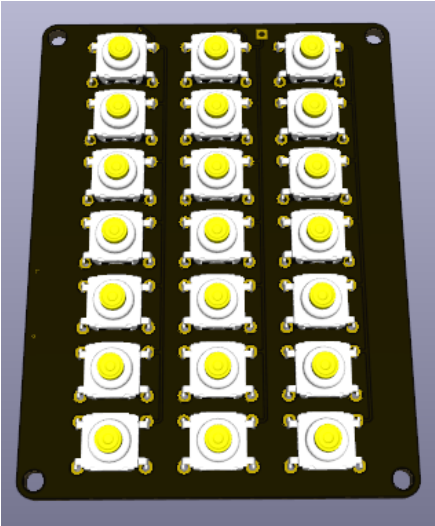


! | NumPad Module KiCAD Schematic. |



Routing and Component Placement. |

|:--😄 | NumPad Module PCB



|:--😄 | 3D Render of NumPad Module PCB. |

NumPad BOM

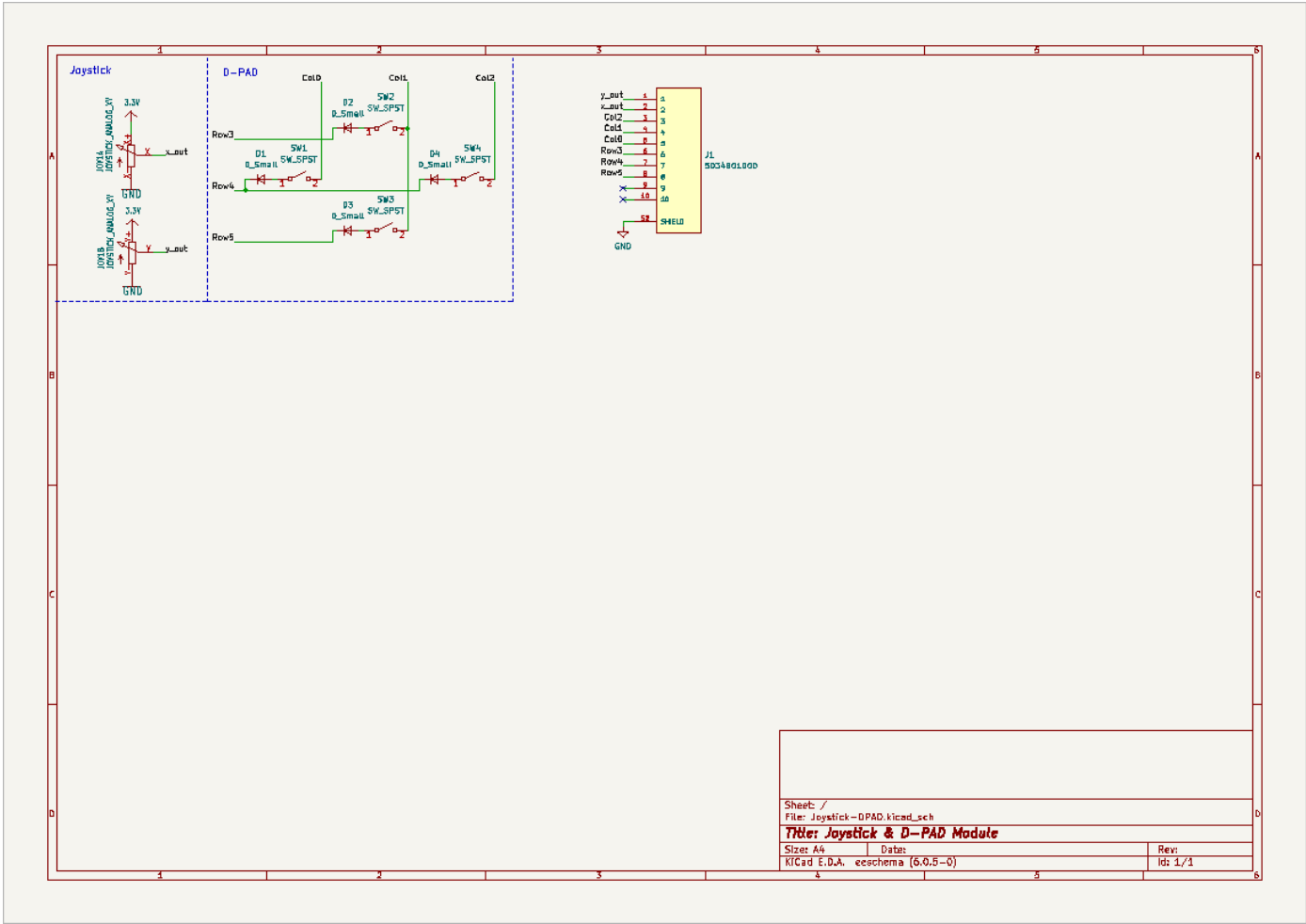
NumPad module PCB manufactured by PCBway's PCB fabrication service. The following table details the components used within the module, along with information on pricing for the actual PCB.

Component	Cost	Link
KSA1M331LFT SPST-NO	\$0.91	<a href="https://www.digikey.com/en/products/detail/c-k/KSA1M331LFT/1003897">https://www.digikey.com/en/products/detail/c-k/KSA1M331LFT/1003897</a>
Tactile Cap Oval (BLACK)	\$0.39	<a href="https://www.digikey.com/en/products/detail/c-k/BTNK0390/559405">https://www.digikey.com/en/products/detail/c-k/BTNK0390/559405</a>
FPC 10Pin Connector	\$1.13	<a href="https://www.digikey.com/en/products/detail/molex/5034801000/2356624">https://www.digikey.com/en/products/detail/molex/5034801000/2356624</a>
1N4148WTPMSCT-ND Diode	\$0.03816	<a href="https://www.digikey.com/en/products/detail/micro-commercial-co/1N4148W-TP/717196">https://www.digikey.com/en/products/detail/micro-commercial-co/1N4148W-TP/717196</a>

Component	Cost	Link
NumPad Module PCB	\$38.18	

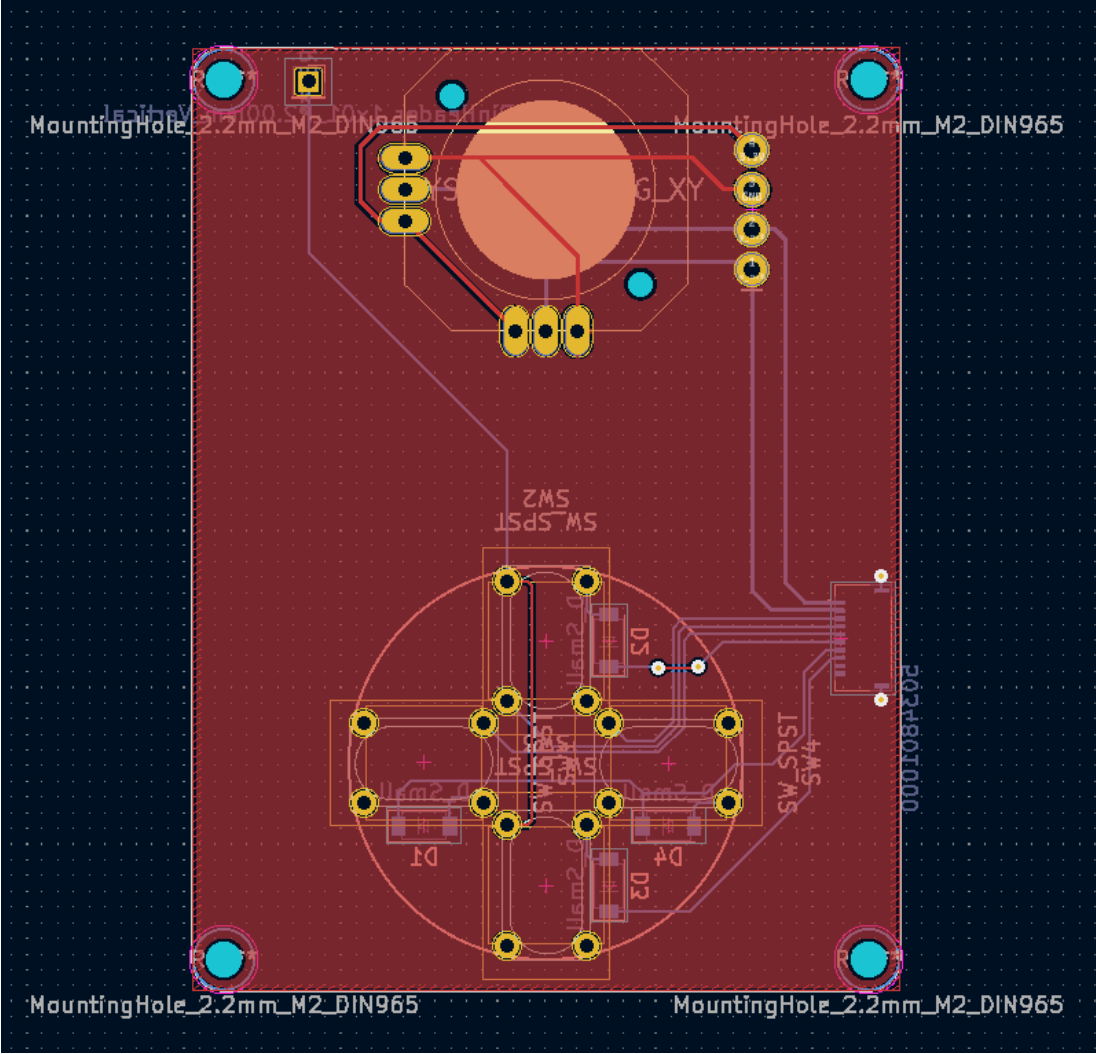
## Joystick Module

The joystick/d-pad module is responsible for mouse movement. Mouse movement is handled by a joystick, arrow key movement is handled by switches under a directional pad.



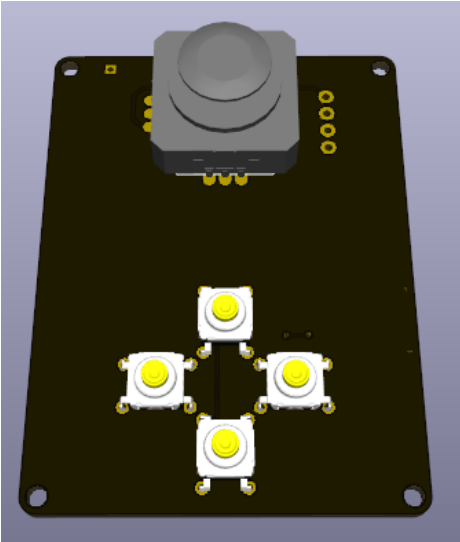
|--🤖 | NJoystick/D-Pad Module KiCAD Schematic. |





PCB Routing and Component Placement. |

|:-- 😊 | Joystick/D-Pad Module



|:-- 😊 | 3D Render of Joystick/D-Pad Module PCB. |

Joystick BOM

NumPad module PCB manufactured by PCBway's PCB fabrication service. The following table details the components used within the module, along with information on pricing for the actual PCB.

Component	Cost	Link
KSA1M331LFT SPST-NO	\$0.91	<a href="https://www.digikey.com/en/products/detail/c-k/KSA1M331LFT/1003897">https://www.digikey.com/en/products/detail/c-k/KSA1M331LFT/1003897</a>
FPC 10Pin Connector	\$1.13	<a href="https://www.digikey.com/en/products/detail/molex/5034801000/2356624">https://www.digikey.com/en/products/detail/molex/5034801000/2356624</a>

Component	Cost	Link
1N4148WTPMSCT-ND Diode	\$0.03816	<a href="https://www.digikey.com/en/products/detail/micro-commercial-co/1N4148W-TP/717196">https://www.digikey.com/en/products/detail/micro-commercial-co/1N4148W-TP/717196</a>
Mini Analog Thumbstick	\$2.50	<a href="https://www.adafruit.com/product/2765?gclid=CjwKCAjw6raYBhB7EiwABge5Kk9TZn8ilWmRzUdasBMNh74FXIZQBj3K6sDLgbHT71pnA3cYCJrNRoC1E8QAvD_BwE">https://www.adafruit.com/product/2765?gclid=CjwKCAjw6raYBhB7EiwABge5Kk9TZn8ilWmRzUdasBMNh74FXIZQBj3K6sDLgbHT71pnA3cYCJrNRoC1E8QAvD_BwE</a>
Joystick/D-Pad Module PCB	\$38.18	