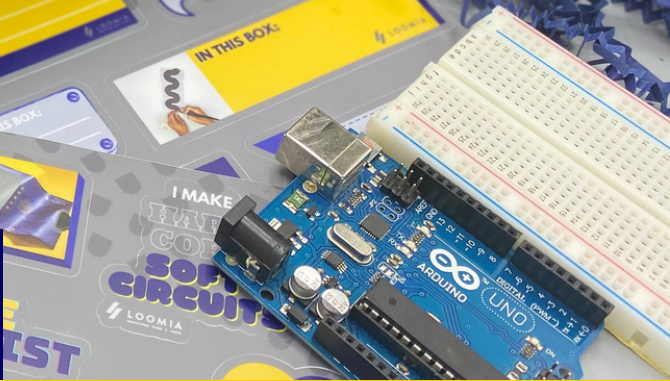


PROTOTYPING PACKS & PARTS

QUICK-START GUIDE

V.01



CONTENTS

QUICK-START GUIDE - 1

USING THIS GUIDE

SAFETY INFORMATION

ABOUT OUR PARTS

CONNECTING TO PARTS

SEWING THE LEL

USING THE STICKY BACKING

POWERING THE LEL

RESOURCES

PART DIRECTORY & PINOUTS - 12

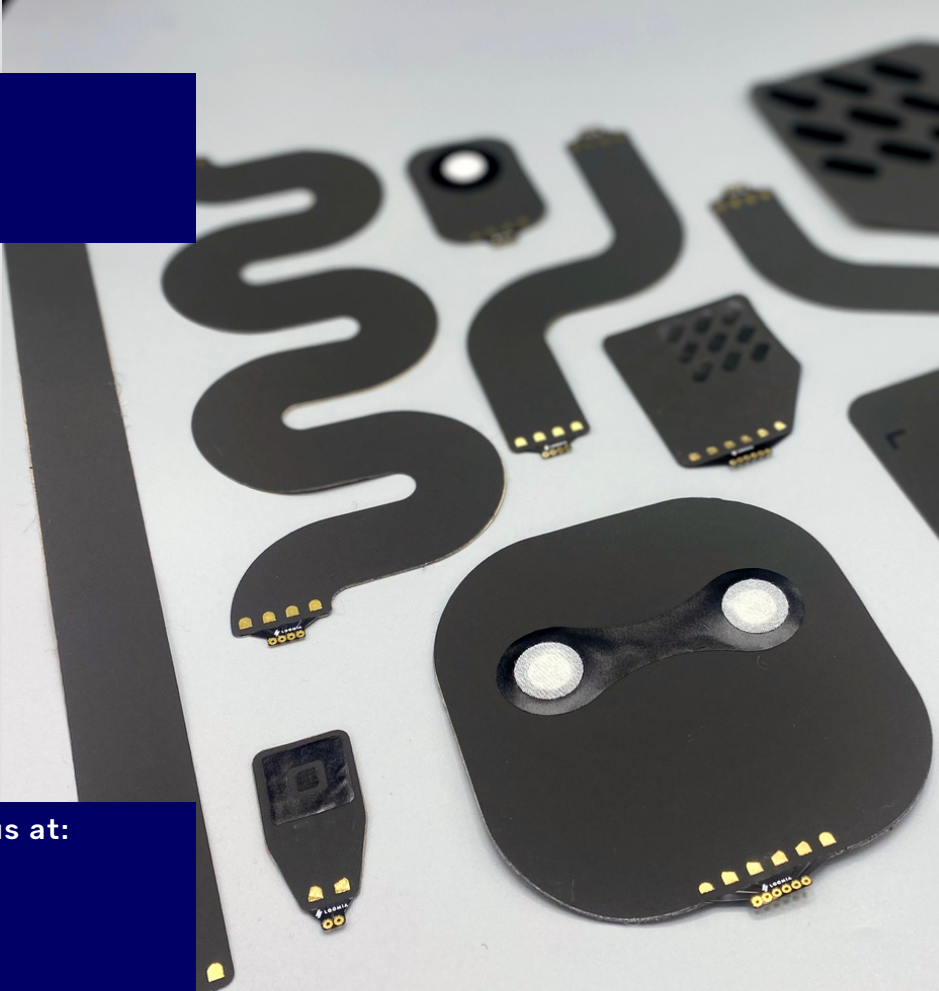
LOOMIA FOR BUSINESSES - 25

Need something else? Please contact us at:

www.loomia.com/contact

or join our developer community at:

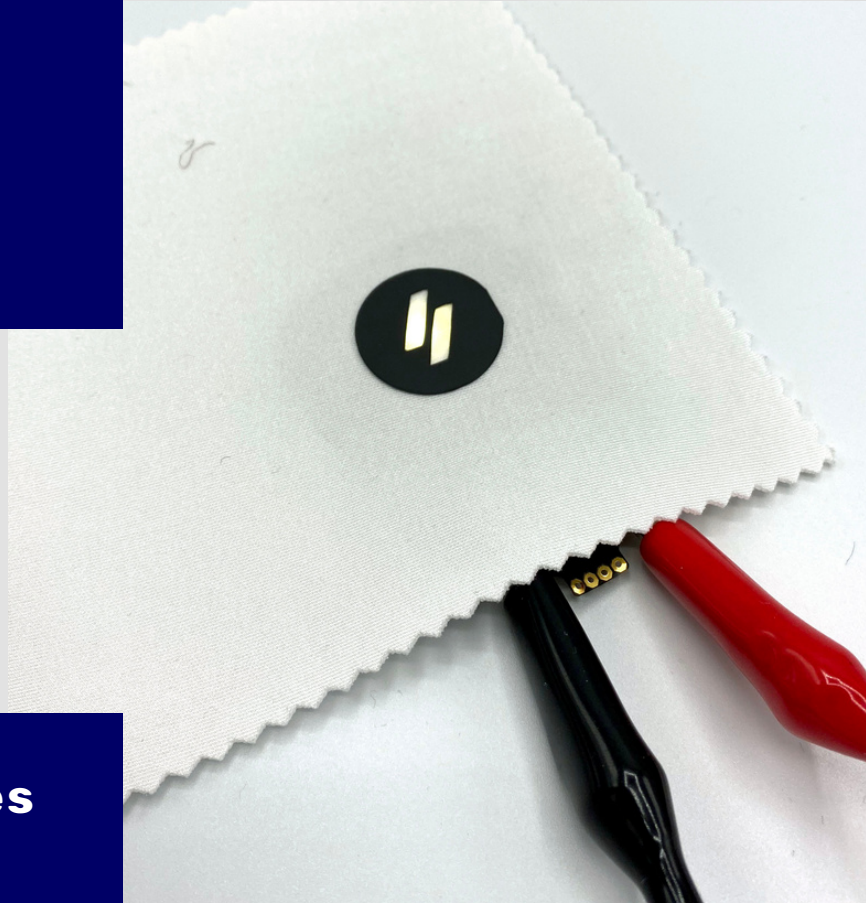
www.loomia.com/community



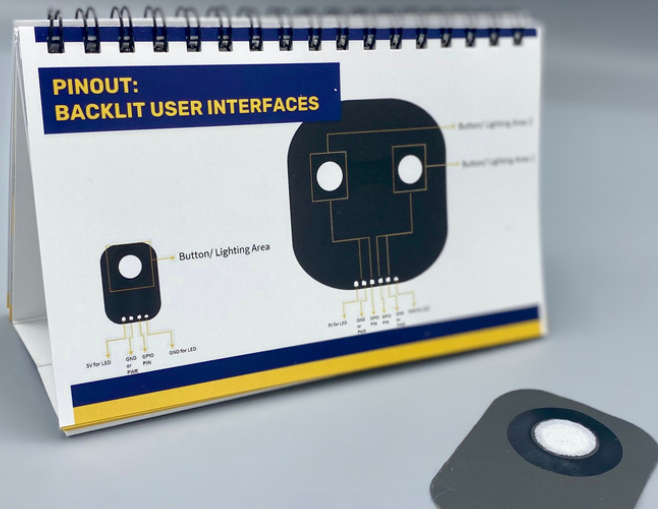
NEW TO PROTOYPING? NO PROBLEM!

Our parts assume a working knowledge of arduino and electronics. If you're new to the space, make sure to check out our courses and workshops to help you get started.

www.loomia.com/courses



QUICK-START



USING THIS GUIDE

This guide is written under the assumption that users are already familiar with Arduino and the basic rules of electronics prototyping. If you are new to prototyping, we recommend you check out our Prototyping 101 online course(www.loomia.com/courses).

This guide can easily stand on a desk or table, so you can follow the pinout guides and instructions hands-free. Prop it up and you're ready to go!

SUSTAINABILITY

We've included a set of label stickers in your box so you can easily re-purpose your Packs & Parts box for new projects. If you need to discard your box, please recycle.

These parts do consist of metals. If you would like to return them to us for proper disposal after use, please email us through our website at www.loomia.com/contact-us



SAFETY

- 1) Do not expose your parts to temperatures higher than 150° F.
- 2) Please take precautions when using these parts. They are designed for experienced prototypers and can be dangerous.
- 3) These parts are **not** for use by children, and should not be considered a toy.
- 4) Do not sew these parts with conductive thread or metallic materials, and take precaution if you choose to sew these parts as it can cause electrical issues or damage.
- 6) Please do not disassemble your parts. They are **patent-protected and may be dangerous if disassembled**.
- 7) Washing of parts is not recommended.
- 8) Please do not cut into the parts, as it's easy to accidentally damage the conductor.
- 9) These parts are for **prototyping only** and not meant to be used in commercial products.

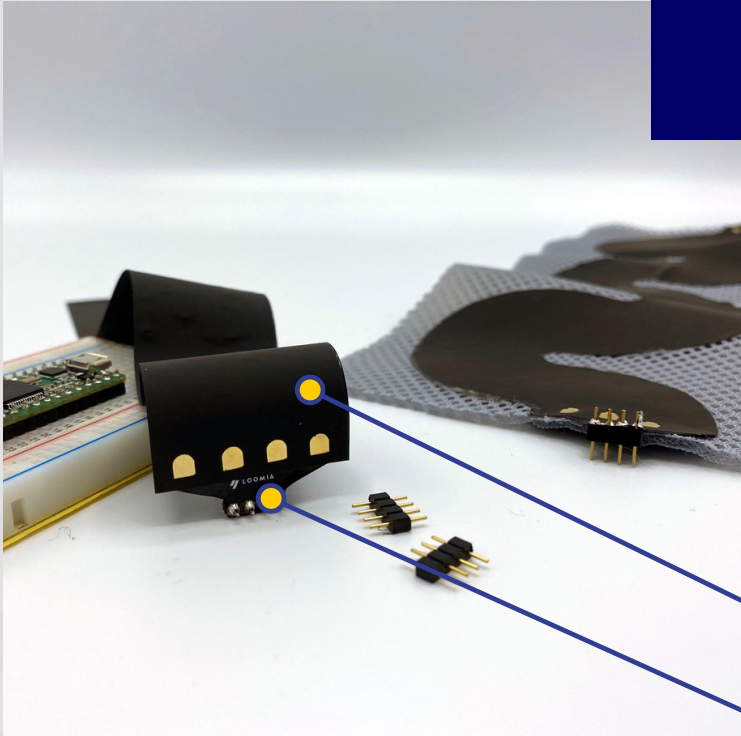


Prop. 65 Warning for California Residents



WARNING: This product may contain chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

ABOUT OUR PARTS



LOOMIA Packs & Parts are developed from our core LEL (LOOMIA Electronic Layer) Technology. From stretchy serpentine buses to pressure sensors, this product has been developed to add refinement and great materiality to your latest prototype. **We focused heavily on designing a versatile interconnect** that could be easily soldered and work in unison with popular microcontrollers like Arduino Nano and Teensy. You can also get creative with the interconnect, soldering snaps, or wires.

About the LEL:

The LEL (LOOMIA Electronic Layer) is a soft, flexible circuit invented by Team LOOMIA. As you'll notice, the LEL is not a textile by itself, but is designed to attach to textiles or other flexible substrates. The LEL consists of three parts:

- 1.) The insulation : The plastic film you feel on the top of the circuit that helps to protect the conductor from dirt and water.
- 2.) The Conductor : The hidden conductive component in each part that is designed to give each part a specific function.
- 3.) The Interconnect: Our equivalent to the "hard-soft connection" that is designed to connect the soft conductor to wires, headers or microcontrollers.



SEWING THE LEL

Sewing the LEL is not recommended, as it's easy to break by accidentally sewing through the conductor.

However, if you must sew for your use case, we recommend:

- Staying as close to the edge as possible (generally within 1/16" or less).
- Using a **Teflon foot** to help you pass the part smoothly through your machine. If you purchased a Lab Pack, a Teflon foot is included.

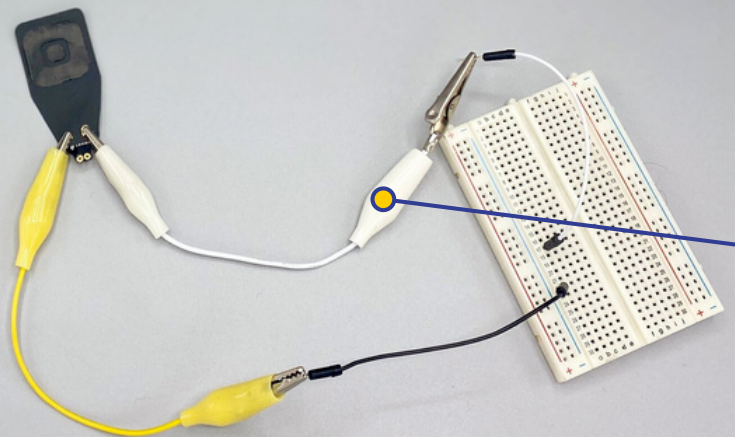


USING THE STICKY BACKING

Each LOOMIA part comes with a sticky backing for easy placement onto a surface material. Our parts stick to a wide range of surfaces such as wood, textiles and plastic sheeting. To stick a part, follow the steps below:

- 1.) Make sure the chosen surface is clean and free of particulates.
- 2.) Remove the brown backing from the part you wish to stick.
- 3.) Place the part onto the chosen surface and press down firmly.

Note: Execute all soldering needed before sticking a part, as soldering over a base material could cause melting or fire hazard.



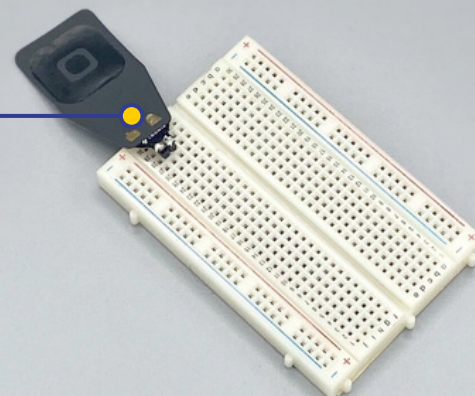
CONNECTING: Alligator Clips

You can easily connect to any LOOMIA Part using alligator clips. Simply clip directly to the exposed pad to get a good connection.

This technique works well for experimentation where you are still broadly testing a circuit.

CONNECTING: Headers

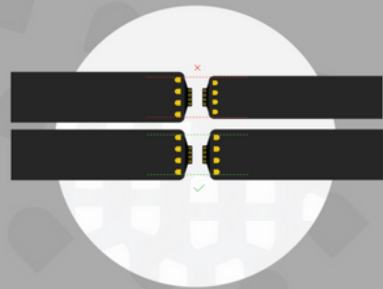
All LOOMIA Parts can be easily soldered to standard pitch headers. Simply solder them in to the bottom of the interconnect for easy breadboarding and attachments. **Repetitive stress can break the interconnect, so this technique is best when your circuit is more settled. Do not use the component as a lever for removal from the breadboard - remove components by the headers, not the LEL portion.**



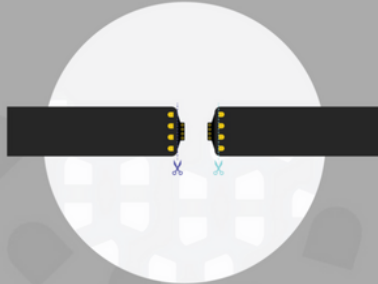


CONNECTING LEL PARTS

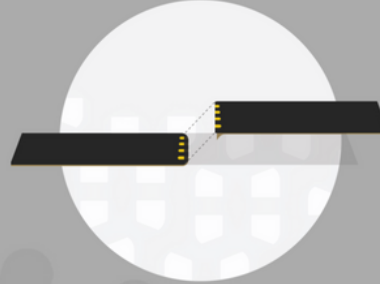
If you wish to connect two LEL parts together, this can be done by trimming and soldering the connector. Don't be intimidated by trimming the connector, you'll master it quickly. We've designed the connector to match up and create pill shapes with other LEL parts. These pills can help you to keep track of each lead's connection. Learn more about the pad shapes on the next page.



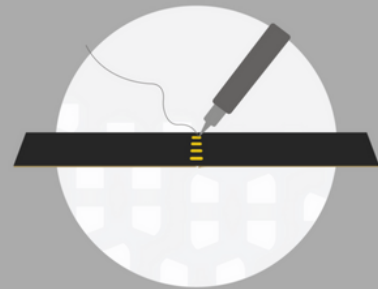
Line up two buses or a bus and a component with the same pitch traces.



Trim off the bottom of the interconnect using standard scissors.



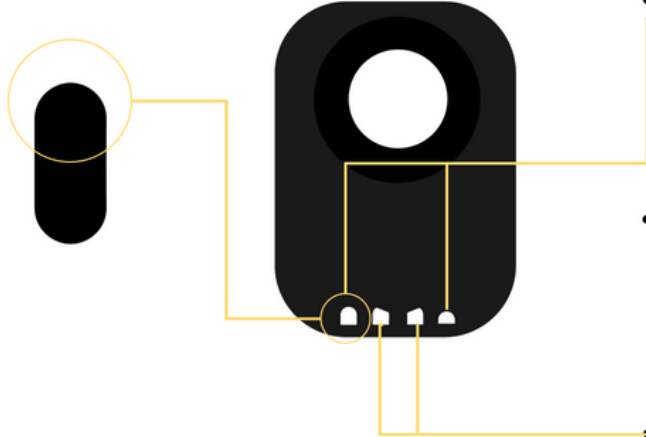
Line up the Parts to create a complete pill shape and peel back the adhesive backing of the Part that will go on top.



Solder across the pads to create a joint.

Pad Guide

Single Backlit User Interface Component



- Power and Ground for Heater and LED



- Row and Column for Pressure Sensor



- Top and Bottom for User Interface



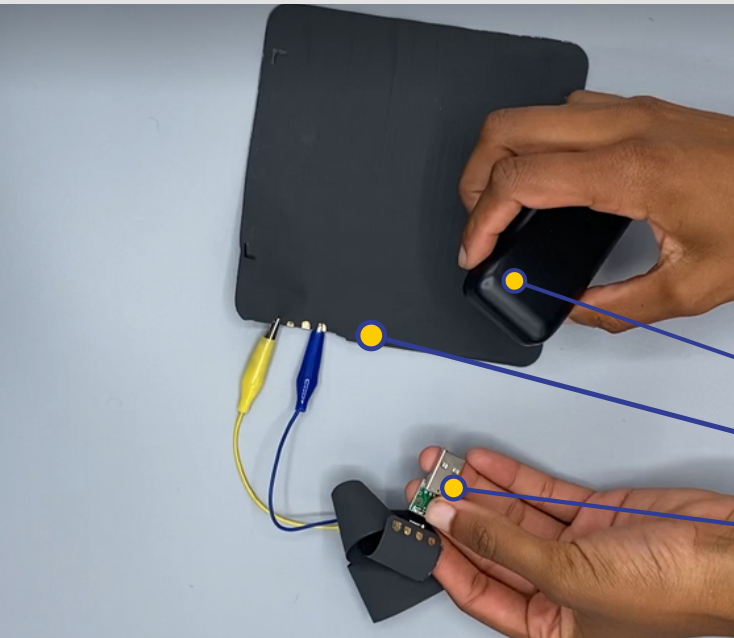
Each part has pads that are shaped to help with assembly. All buses and power connections make a pill when soldered together (shown above). Other parts, make different versions of the pill (shown right) depending on the functionality of each lead.

POWER RECOMMENDATIONS



Most LEL Parts can run off of a 5V powerbank. For a simple power connection, we recommend using a USB breakout board that is soldered to headers and plugged into an off-the-shelf powerbank.

For high-current applications such as heating, make sure the powerbank can output at least 2A. For lower current applications, powerbanks will often shut off after a set period of time. Be mindful of this if you're trying to use a powerbank with one of our backlit user interface components.



RAVPOWER CANDYBAR POWER BANK

LEL HEATER

USB BREAKOUT SOLDERED TO THE LEL 4-WIRE BUS

RESOURCES

HELP

Don't get stuck. Give us a shout by contacting us at www.loomia.com/contact . You can also join our community at www.loomia.com/community.

COURSES

Completely new to electronics? Check out our **introductory courses** at www.loomia.com/courses. We'll get you started!

TUTORIALS

Visit www.loomia.com/packspartstutorials to get inspired and to find useful code snippets and schematics.

Color-changing wall art by Yuchen Zhang using the Packs & Parts heater and 4-Wire Bus

PART DIRECTORY & PINOUTS

KINDS OF PARTS

Our components are bendable, flexible and drapable - perfect for soft robotics, wearables, and other soft circuits that need flexibility.

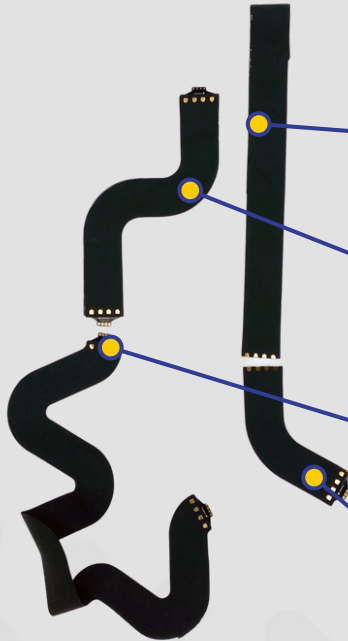
Our components fall into 4 main categories:

- Buses
- Heaters
- Pressure Sensors
- User Interfaces

The following pages include pinout guides for each family of components.



BUSES



0.15" Straight Bus: The straight 4-wire bus has 4 leads that are each .15" wide. Each "wire" is low resistance, giving you fast data speed and solid wattage without heating up. Each bus is twistable, drapable, and bendable for all soft circuit needs. This bus can be easily soldered to the S-curve bus or C-Curve bus to make different shaped traces for wearable tech applications.

0.15" S-Curve Bus : The S-Curve bus is perfect for when you need to make an unusual geometry from our LEL buses. You can combine two to make a big C-Curve to go around an elbow, or just use one to route wiring where you need it for soft robotics or for an installation.

0.15" Serpentine Bus: This serpentine has .15" traces making it compatible with our S-Curve and C-Curve samples. Use this bus for additional stretch as it has up to 20% elongation. We suggest this bus for wearable tech applications.

0.15" C-Curve Bus: The C-Curve bus is perfect for connecting two .15" buses together at a wide angle. Try using this part for creating conductive lines over shoulders or over large surface areas.

DATA- BUSES



C-Curve Bus

Bend Radius Limitation: None

Thickness: Approx. 10 mils

Max Current Per Trace: 1A

Component Dimensions: 4" x 3"

Resistance per trace: < 1 ohm



Serpentine Bus

Bend Radius Limitation: None

Thickness: Approx. 10 mils

Max Current Per Trace: 1A

Component Dimensions: 3" x 10"

Resistance per trace: < 2 ohm

Elongation: Up to 20%



4-Wire Bus

Bend Radius Limitation: None

Thickness: Approx. 10 mils

Max Current Per Trace: 1A

Component Dimensions: 1.5" x 12"

Resistance per trace: < 1 ohm



S-Curve Bus

Bend Radius Limitation: None

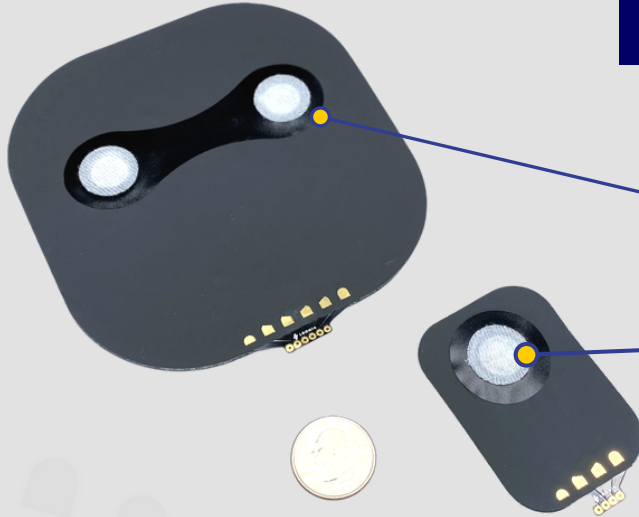
Thickness: Approx. 10 mils

Max Current Per Trace: 1A

Component Dimensions: 4" x 6"

Resistance per trace: < 1 ohm

USER INTERFACES



Double Backlit User Interface: The double backlit button is like the single backlit button, but twice the fun! Use this part if you need to control something up and down, or right to left. Using cut-out vinyl, you can create icons and decals on fabric that show your users the button functionalities.

Single Backlit Button: The single backlit button is a simple mechanical switch that comes with an LED inside. When you press the button, the circuit is completed, driving your pin high or low. Use the embedded LED to make a glowing power icon, logo, or whatever you desire.

DATA- USER INTERFACES

Single Backlit Button

Bend Radius Limitation: .5" around button area

Thickness: Approx 1 mm at button

Operating Voltage Range: 5V

Component Dimensions: 2" x 3"

Button Dimensions: 1" diameter circle

Durability: 10,000 presses under 5lbf



Double Backlit User Interface

Bend Radius Limitation: .5" around button area

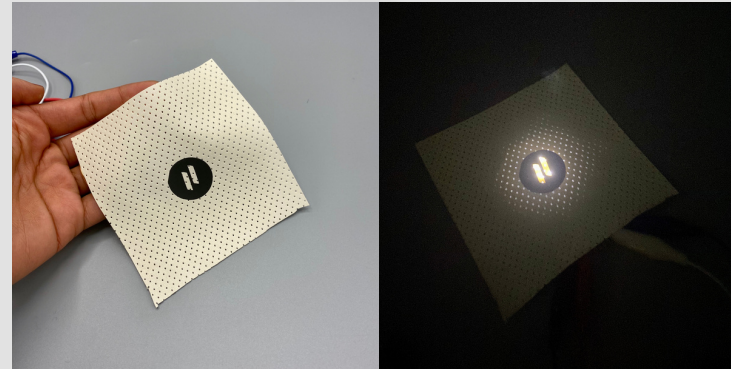
Thickness: Approx 1mm at button

Operating Voltage Range: 5V

Component Dimensions: 4.6" x 6.3"

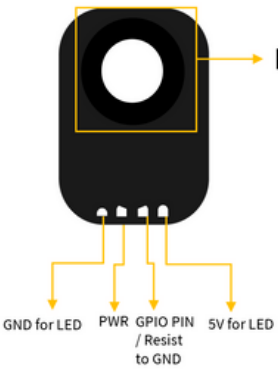
Button Dimensions: 1" diameter circle

Durability: 10,000 presses under 5lbf

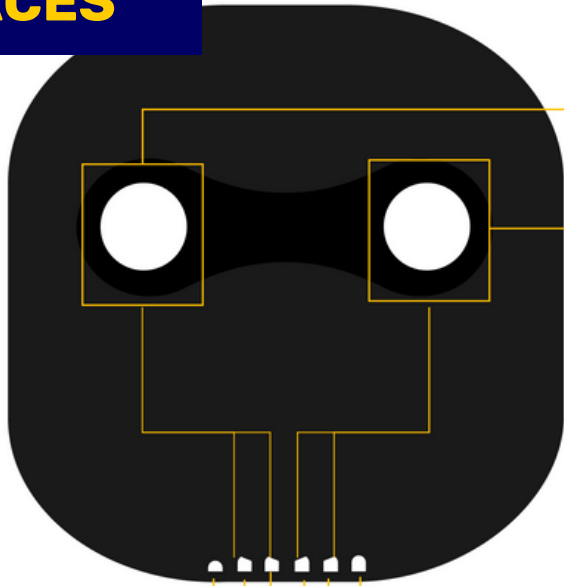


TIP: Use a cut-out vinyl sticker or other kind of mask to make backlit logos from your button.

PINOUT: BACKLIT USER INTERFACES



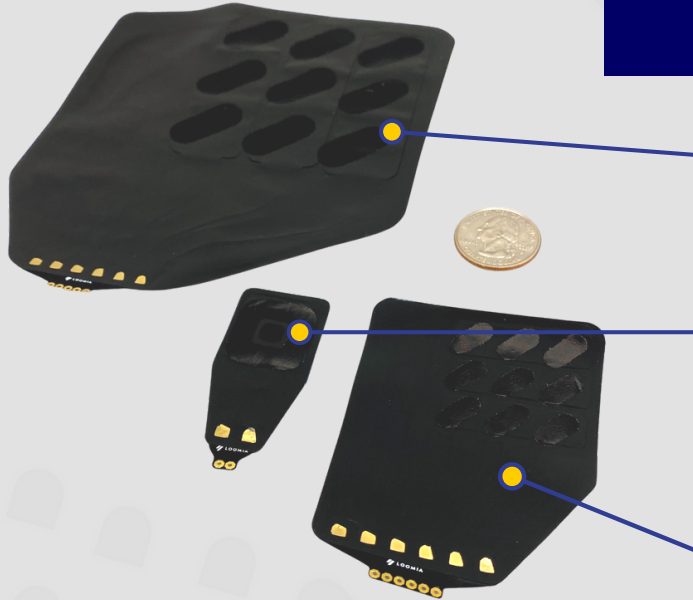
Button/ Lighting Area



Button/ Lighting Area 2

Button/ Lighting Area 1

PRESSURE SENSORS



Mega Pressure Matrix: Like the mini pressure sensor... but bigger! Our 3x3 mega pressure matrix has 6 leads, allowing you to map which point you are at in the 3x3 matrix and get a pressure mapping over a surface. Each area has an analog readout that varies depending on the weight of the item on the pressure sensor. Generally, sensor values will read from 500Kohms to 100ohms depending on the force put onto the sensor.

Single Pressure Sensor : The mini single pressure sensor gives you an analog read that maps to force on the sensor. The more you press, the lower the resistance goes, perfect for on-body pressure related sensing like ribcage expansion for breathing. This sensor is small but mighty, making it convenient for small surface area applications.

Mini Pressure Matrix: If you are looking to map pressure over a 1.25" area, this is the one. Our 3x3 mini pressure matrix has 6 leads, allowing you to map which point you are at in the 3x3 matrix. Each area has an analog readout that varies depending on the weight of the item on the pressure sensor. Generally, sensor values will read from 500Kohms to 100ohms depending on the force put onto the sensor.

DATA- PRESSURE SENSORS

Quick-Start Tip:

Make sure to visit our website at www.loomia.com/packspartstutorials for starter code for the matrices!



Mini Pressure Matrix

Bend Radius Limitation: None
Thickness: Approx 20 mils
Operating Voltage Range: 3.7V-5V
Pressure Range: .2lbs - 10lbs
Component Dimensions: 2.3" x 3"
Sensing Area Dimensions: 1.25" x 1.25"



Mega Pressure Matrix

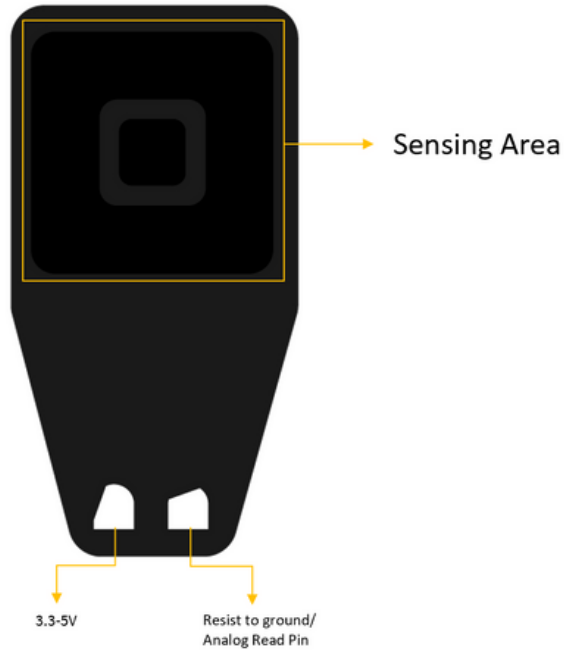
Bend Radius Limitation: None
Thickness: Approx 20mils
Operating Voltage Range: 3.7V-5V
Pressure Range: 0.2lbs - 10lbs
Component Dimensions: 5" x 6.5"
Sensing Area Dimensions: 3" x 3"



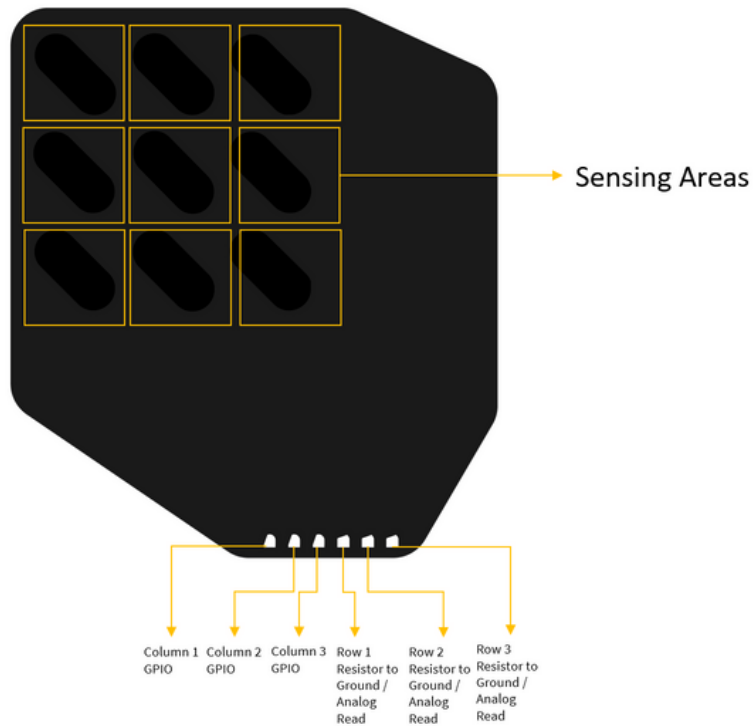
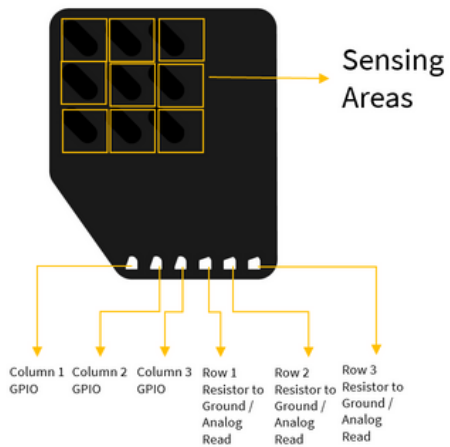
Single Pressure Sensor

Bend Radius Limitation: None
Thickness: Approx 20 mils
Operating Voltage Range: 3.7V-5V
Pressure Range: .2lbs - 10lbs
Component Dimensions: 2" x 1"
Sensing Area Dimensions: .75" x .75"

PINOUT: SIMPLE PRESSURE SENSOR



PINOUT: PRESSURE MATRICES



5V-7.2V HEATER



5V-7.2V Heater: This heater is made to work with an off-the-shelf, 5V battery pack or two lipo batteries (be sure both can output 2A safely). The heater will get hotter depending on the voltage you use. The heater warms up quickly with tangible heat within 60 seconds and top heat after 2 min. Use this component for heating devices, or for thermochromic effects.

DATA:

Bend Radius Limitation: None

Thickness: Approx 10mils

Operating Voltage Range: 5V - 7.2V

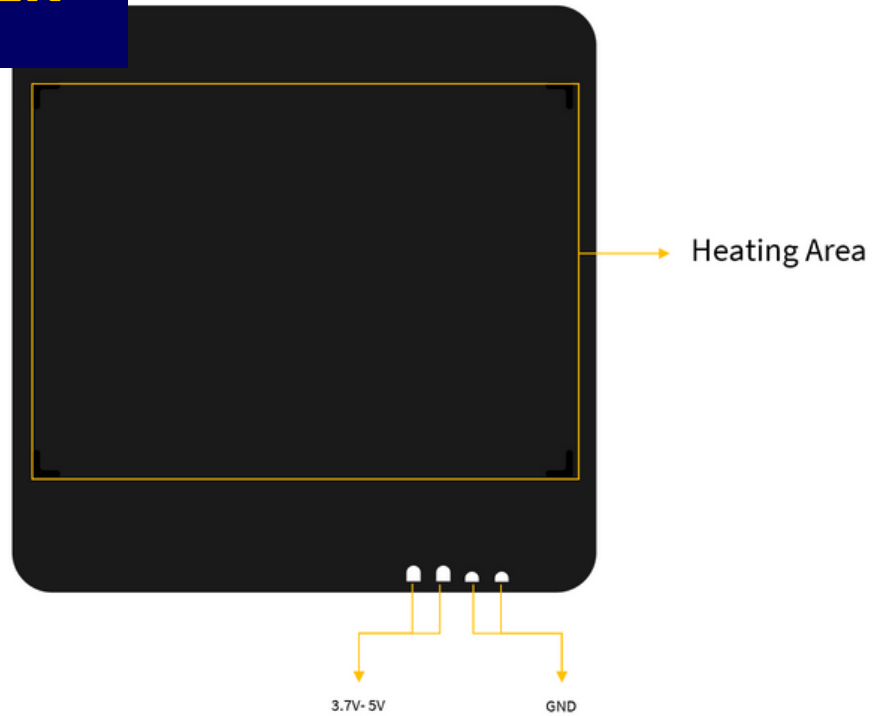
Operating Current Range: 1A - 3A

Operating Temperature: 130 - 150 degrees F

Component Dimensions: 6" x 6"

Heating Area Dimensions: 5.75" x 4"

PINOUT: HEATER





LOOMIA FOR BUSINESS

Using our patented e-textile technology, the LOOMIA Electronic Layer (LEL) , **LOOMIA designs and manufactures LELs for various industries.** Our customers range from aerospace, to automotive Tier 1s and electronics manufacturers, among others.

We engage with customers through the LOOMIA Lab program, which takes us from a specification, to a fully functioning and integrated prototype that can then be scaled, or used for management reviews.

NEED SOMETHING CUSTOM?

Contact us to get started: www.loomia.com/contact

1

Assess our Technology



LOOMIA Packs and Parts allow you to test out LOOMIA technology with a low investment. Check out our sensors and buses to see if LOOMIA tech is a good fit for your scope.

Our multi-function demonstrator is also a useful assessment tool. **Find all of our parts and samples for sale at www.loomia.com/shop and www.loomia.com/packspartsshop**

2

Build a custom LEL in the LOOMIA Lab



If our technology meets your spec, we'll write up a proposal for a project in the LOOMIA Lab. The LOOMIA Lab is where we customize our technology for your use case. This program can last from a few weeks to a few years, all depending on the complexity of your application.

The outcome of the LOOMIA Lab is a POC that can be put into production.

3

Produce at Scale



Produce your part at scale with our ISO certified manufacturing partner, Eastprint. Eastprint serves Global Fortune 500 companies in large scale production up to 20,000 units a week.



Solar powered safety backpack by Amped Atelier using the Packs & Parts backlit button and 4-wire bus

TIME TO GET MAKING!

We would love to see what you build.
Tag us on social media so we can see and
share your work!



@LOOMIA_TECH



@LOOMIA_TECH