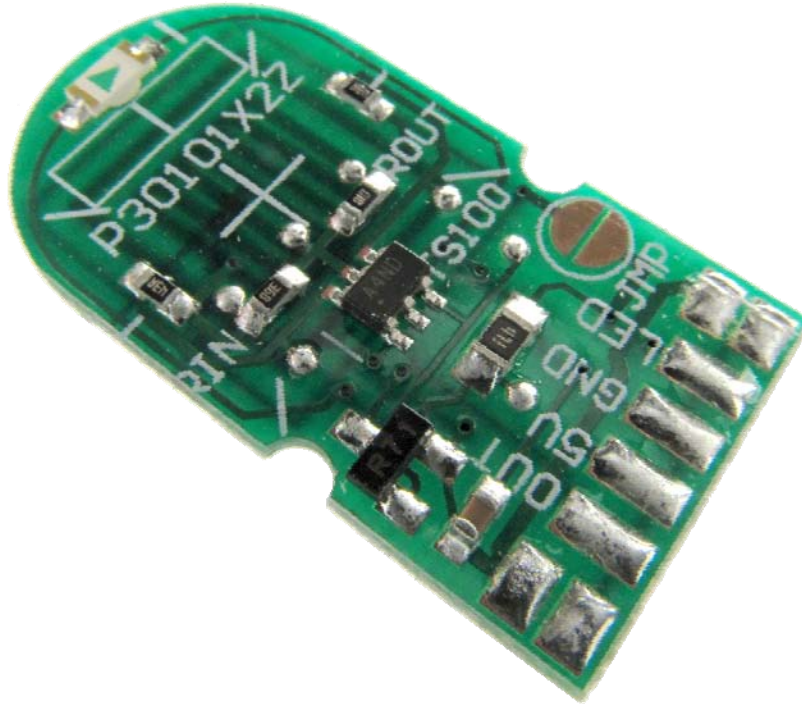


## Series-100 Modular Interface Component



## INSTALLATION INSTRUCTIONS

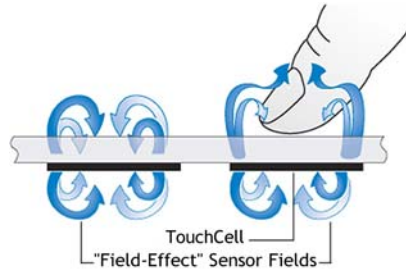
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### CAUTION!

Read this Operator's Manual carefully prior to using this device. Failure to understand and follow the contents of this manual may result in electrical shock, damage to the product, or

## What is the Modular Interface TouchCell?

The IntuiTek™ Modular Interface TouchCell™ is a customizable user interface that is radically simple to configure and install.



It operates on 3 to 5VDC and uses patented "Field-Effect" sensing technology to accurately and instantly detect a finger's touch directly through a glass or plastic substrate.

This ultra-reliable momentary on-off switch can be used in single or multiple arrays. It enables almost any non-conductive surface to become a trouble-free user interface.

IntuiTek TouchCell technology is used across multiple markets and in a wide range of high-volume, safety-critical applications. This innovative peel-n-stick touch input device is ideally suited for:

Low-volume to mid-volume manufacturers  
Industrial designers  
Engineering development and prototyping  
Students and hobbyists

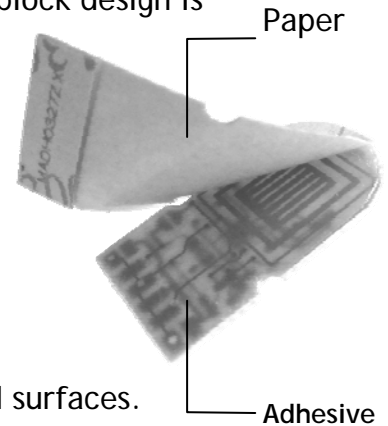
## Features

### Reliability

- Field Proven: Nearly 200 million TouchCells working globally in commercial user interface and fluid-sensing applications.
- Solid-state switching: NO MOVING PARTS to wear out; no membrane pads to crack or stick.
- Robust against false actuations.
- Mounts behind a protective surface.
- Ideal for vandal-resistant applications.

### Simple Application

- Modular building-block design is ideal for creating customized user interface panels.
- Fast, easy, "peel-n-stick" installation.
- Ultra-thin design.
- Easily mounts behind non-conductive sealed surfaces.
- 3 to 5 VDC digital switch for simple, safe assembly.
- Solder pads for hand soldering electrical connections.



### Intuitive Interface Design

- Uses patented TouchSensor® "Field-Effect" sensing technology to detect the human touch.
- Works behind specified thickness of glass or plastic. Turns your graphical design into an interactive keypad.
- Single-point LED feedback option.
- Multiple TouchCells can be actuated at the same time, if required.

## Safety Information and Precautions

### SAVE THESE INSTRUCTIONS

Read and Understand these Type of Warnings:

- DANGER:** Means that someone could be injured or killed if the Personal Safety Information is not followed.
- CAUTION:** Means that product damage could result if Precautions are not followed.
- NOTICE:** Means that product performance could be impaired if Precautions are not followed.

### Personal Safety

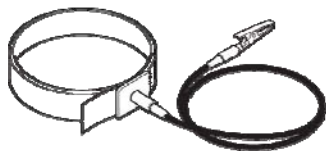
**DANGER:** While installing the IntuiTek™ Modular Interface Components you may be exposed to sharp tools and high heat.

You can safely install the IntuiTek Modular Interface Components ONLY IF YOU:

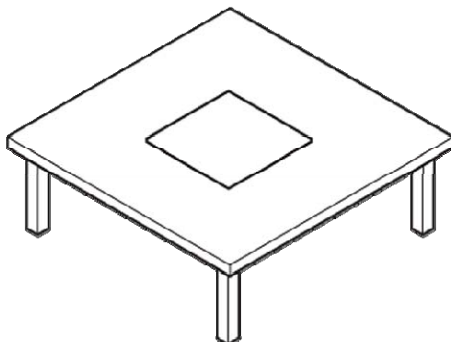
- Maintain a well-lighted, uncluttered work environment.
- Use caution around soldering tools that can attain 750° F.
- Use caution with cutting tools.

### Options

Anti-Static Wrist Strap



Anti-Static Work Area



### Product Precautions

**CAUTION:** Read and understand this entire manual before applying the TouchCell™ product. You should thoroughly understand:

The TouchCell types and which of them can be used with specific substrates (see Part Numbers, Page 4)

The TouchCell Specifications (Pages 5 - 7)  
Prevention against overdriving the LEDs (Page 6)

Important process for correctly aligning EACH TouchCell with its graphical overlay element (Pages 11–12)

To ensure reliability, the TouchCell adhesive is PERMANENT. Once you apply the adhesive, you cannot remove or re-align the TouchCell.

### Anti-Static Precautions

**CAUTION:** Before you unpack or handle any TouchCell, wear an Anti-Static Wrist Strap that is connected to a grounded work area.

Each TouchCell array is a sensitive electronic component. Until the array is wired and grounded it can be destroyed by static discharge.

### Graphical Interface Requirements

**NOTICE:** Use of conductive inks on the Graphical Interface will limit TouchCell function.

## Series 100 – Modular Interface Component Overview

Optional single-point LED indicator for visual feedback

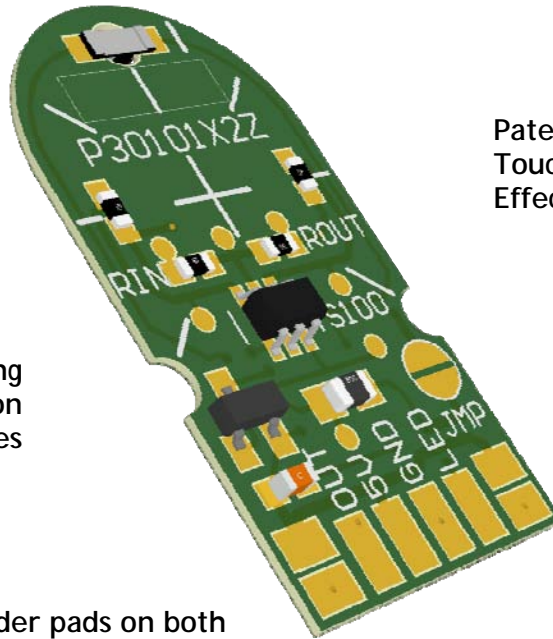
Rounded circuit board design for circular slider layouts

Centerline and registration marks for touch panel graphics alignment

Patented software-free TouchSensor® “Field-Effect” sensing technology

Notches for holding TouchCells in position on assembly fixtures

User-selectable jumper pads for illuminating LED with TouchCell output



Auxiliary solder pads on both sides for “daisy-chaining” power supply to adjacent TouchCells

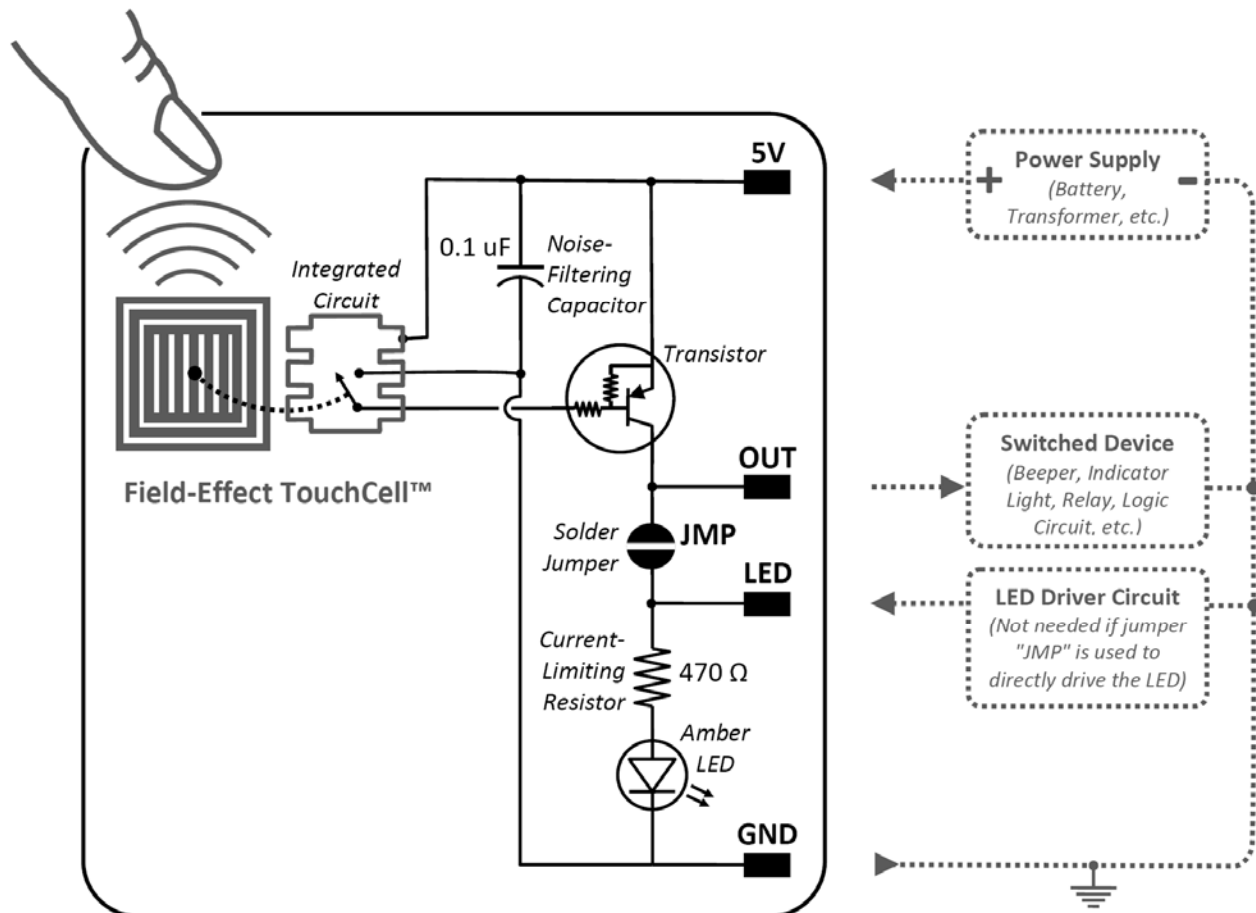
### Part Numbers

COMPONENT	PN	SUBSTRATE	ARRAY	LED
<b>For Plastic Substrate</b>				
Non-Lit Arrays	Z3011NAAZ	2 mm Plastic	1 X 1	(Not Provided)
Point Lit	Z3011PAAZ	2 mm Plastic	1 X 1	Amber
<b>For Glass Substrate</b>				
Non-Lit Arrays	Z3011NABZ	4 mm Glass	1 X 1	(Not Provided)
Point Lit	Z3011PABZ	4 mm Glass	1 X 1	Amber

## General Specifications

Specification	Description
Clearances Required	Requires a 10mm spherical "Clear Zone" behind each sensor to assure proper operation. (See Assembly Instructions, Page 13)
Dimensions (mm)	15mm W X 28mm L X 10mm D
Switch Technology	Field-Effect Solid-State electronic switching
Switch Function	Momentary (as long as finger is present)
Electrical Interface	Standard logic active high
FCC Rating	Class B Device
Lighting	Optional Amber LED indicator light
Mounting	Adhesive with protective liner included for "peel-and-stick" mounting to the back of substrate panels as specified in Part Number table above
Wiring Options	Hand-soldered to solder pads
Agency Certification	UL Recognized Component, File Number E187820

## Schematic



## TouchCell™ Integrated Circuit Specifications

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
<b>Operating Conditions</b>						
Supply Voltage ( <i>See note 1</i> )	Vdd	Vdd to Vss	4	5	6	VDC
Supply Current	Idd	(Vdd to Vss = 5 volts) Un-actuated, sensor current only	3	16	30	μA
Response Time to a Trigger Event	<sup>†</sup> RESP STB	Vdd supply = Strobe Mode			260	μs
Response Time to a Trigger Event	<sup>†</sup> RESP DC	Vdd supply = DC Mode		160		μs
<b>Output Conditions</b>						
Output Load Current	I <sub>Load</sub>	V <sub>OL</sub> = 0.2 volts typical, R load = 500 ohms			9.6	mA
Vout High (Output = Off)	Voh	4.7k Ω pull-down	Vdd - 0.15			Volts
Vout Low (Output = On)	Vol	4.7k Ω pull-down			0.15	Volts
Recommended Output Load Resistor	R <sub>L</sub>	External pull-up resistor to Vdd	4.7k		47k	Ohms
Output Leakage Current	I <sub>L Output</sub>	Output = Off, with Pull-Up resistor to Vdd, @ 25°C			100	nA

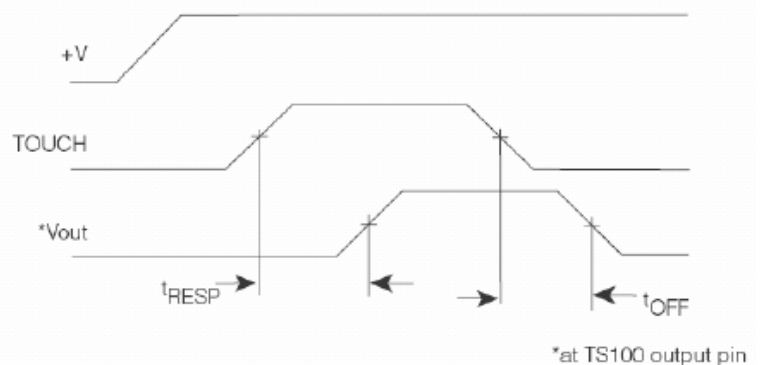
### Notes:

- Supply voltages (Vdd to Vss) outside the limits will result in undetermined output conditions and may not reflect a valid activation.

### Interface Considerations:

- An external pull-down resistor (1K to 10K ohm) is required on the output of the Series 100 TouchCell™ (connected between the OUT and GND terminals).
- It is recommended that a decoupling capacitor (0.01 uf) is used on the output of the Series 100 TouchCell™ (connected between OUT and GND).
- The output state of the Series 100 with an external “pull-down” resistor at power-up (un-activated) is a logic

### DC MODE TIMING DIAGRAM

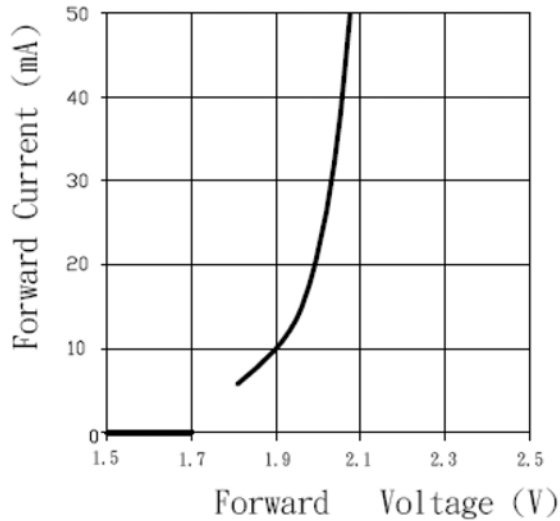


## LED Indicator Specifications

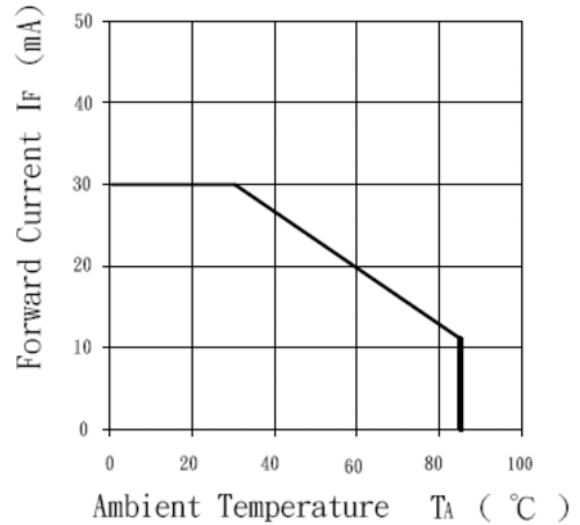
**CAUTION:** It is important not to overdrive the LEDs. External current limiting is required. Use the graphs below to determine the maximum current to drive the LED's per your application.

### Amber LED (Single-Point Indicator)

Forward Current vs. Forward Voltage



Maximum Forward Current vs. Temperature

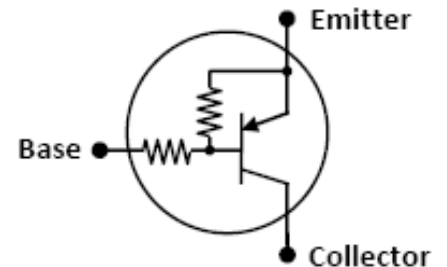


## Output Transistor Specifications

**CAUTION:** It is important not to overload the output transistor. Use the table below to determine the maximum current load for your application.

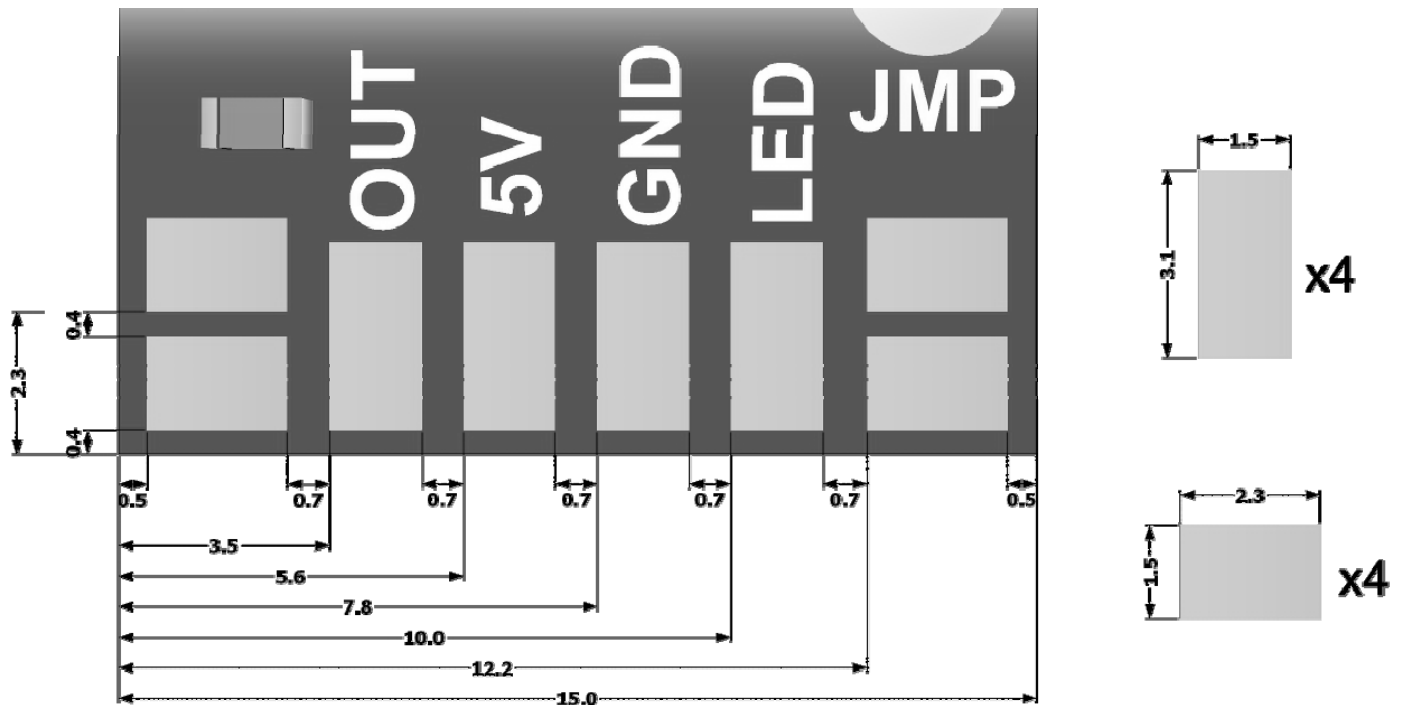
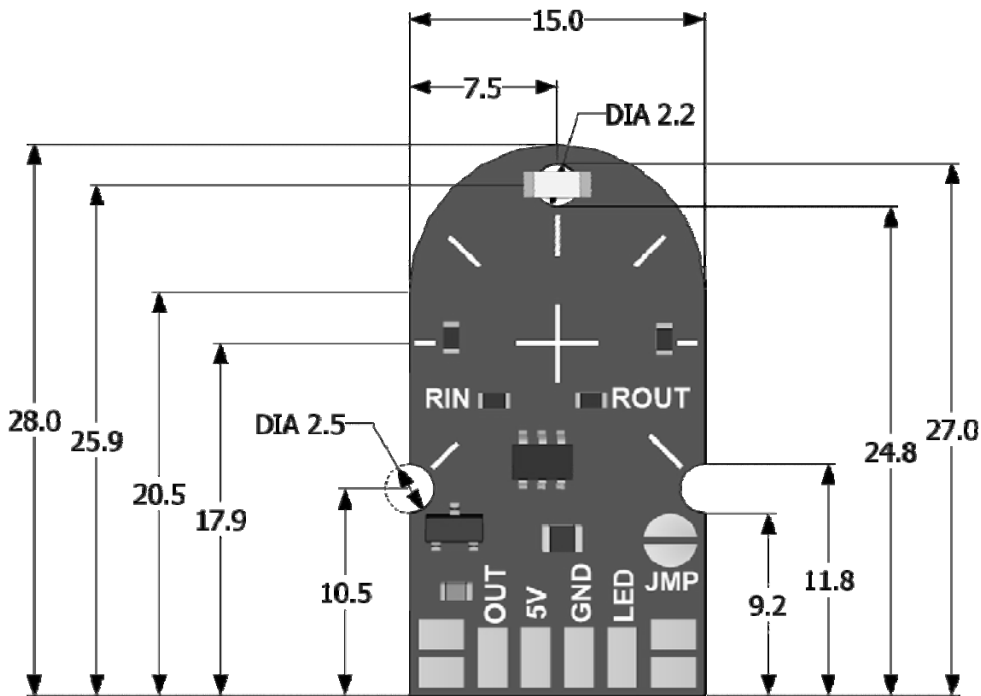
### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	50	Vdc
Collector-Emitter Voltage	$V_{CEO}$	50	Vdc
Collector Current	$I_C$	100	mAdc



## Mechanical Dimensions

*NOTE: All dimensions in mm unless otherwise specified.*

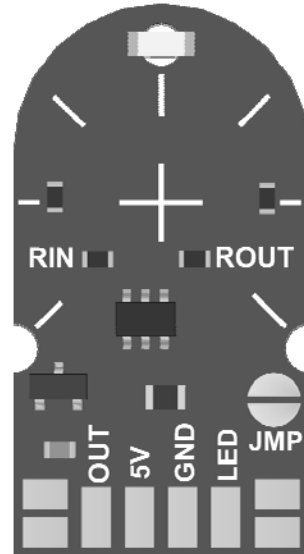




## Electrical Connections

**CAUTION:** Follow these pin layouts to install the IntuiTek™ Modular Interface Components. Failure to follow these guidelines could damage the IntuiTek array and other electronics connected to the component.

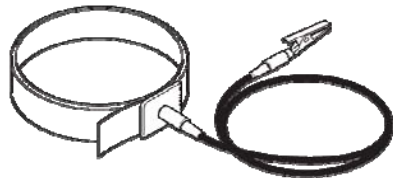
Solder Pad	Description
"5V"	5 VDC (+/- 10%) Power Supply Input
"GND"	Power Supply Ground
"OUT"	4.7 VDC Switched Output
"LED"	LED Driver Input



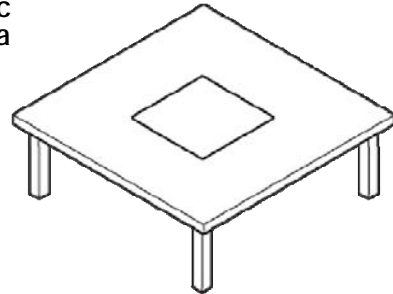
## Assembly

### Required Tools

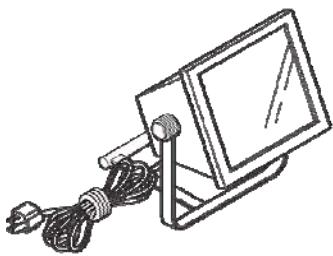
Anti-Static  
Wrist Strap



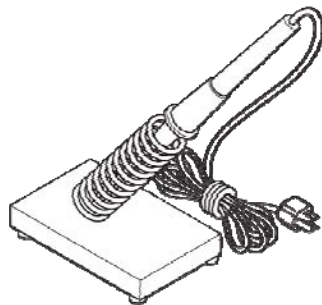
Anti-Static  
Work Area



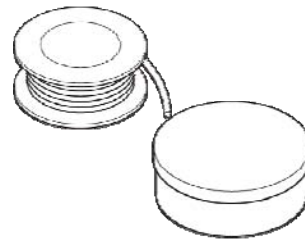
### Recommended Tools



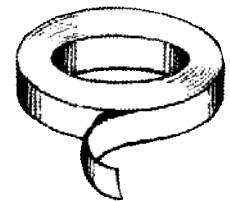
Proper Lighting



60-Watt Soldering Iron,  
0.8mm Tip, 750° F



Solder (0.4mm)  
and Solder Paste



Masking Tape

## Surface Preparation

**NOTICE:** Additional thickness of inks, paints, coatings, graphic overlay, etc. to the overall thickness of the substrate panel may affect the TouchCell™ sensitivity setting.

**NOTICE:** Use of conductive inks on the substrate panel will limit TouchCell function.

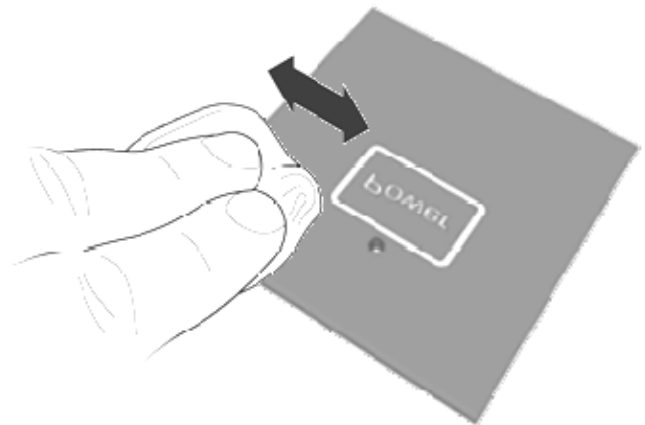
**CAUTION:** Substrate panel must be properly grounded to avoid static damage to the TouchCell circuitry.

1. Substrate panel must meet these requirements:
  - Grounded to prevent static discharge.
  - Maximum of 4mm glass or maximum of 2mm plastic (ABS, PVC, polypropylene, polycarbonate, etc.)
  - Exterior side of panel (user touch surface) can be textured, colored, or painted, and can accept a printed or glued graphical overlay.
  - Thickness of graphic overlay, paint or vinyl appliqué **MUST BE** included in the overall substrate thickness calculation.
  - Interior side of panel (TouchCell mounting surface) must be smooth and free of dust particles so there are **NO AIR BUBBLES** trapped between the substrate panel and the TouchCell when adhered.
2. Where arrays will be attached, clean surface thoroughly with isopropyl alcohol.

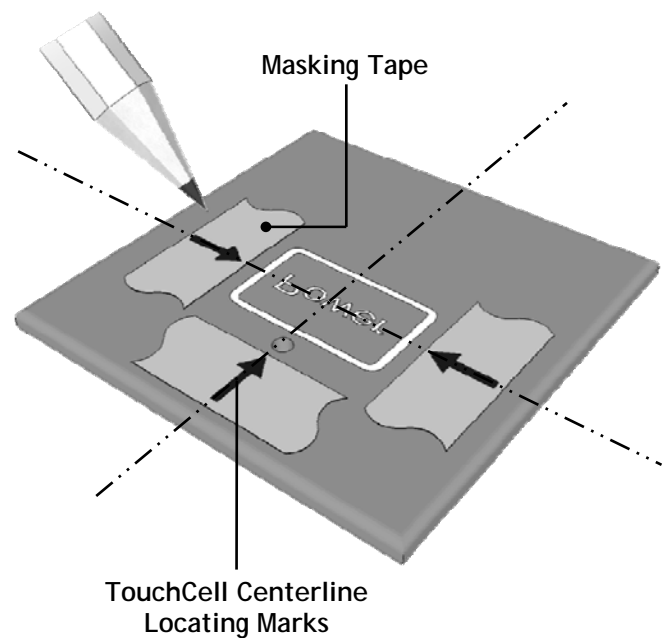
## TouchCell Locating Marks

**NOTICE:** TouchCell “active area” should align with substrate panel “touchpad” graphics. Misalignment of TouchCell and panel graphics may affect user perception of TouchCell sensitivity setting.

**CAUTION:** The TouchCell adhesive is intended for only one application. Once an array is adhered, it cannot be realigned or moved.



Back of substrate  
(Clean with Isopropyl Alcohol)



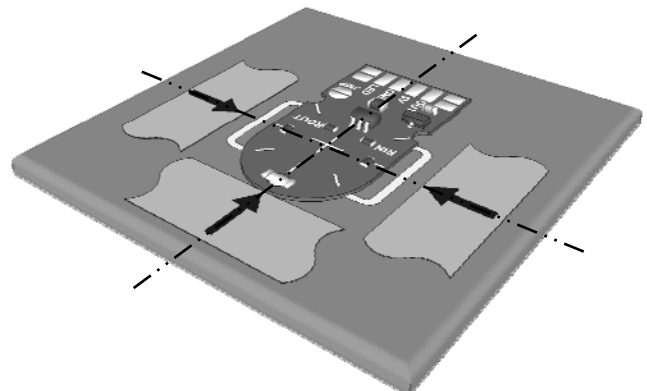
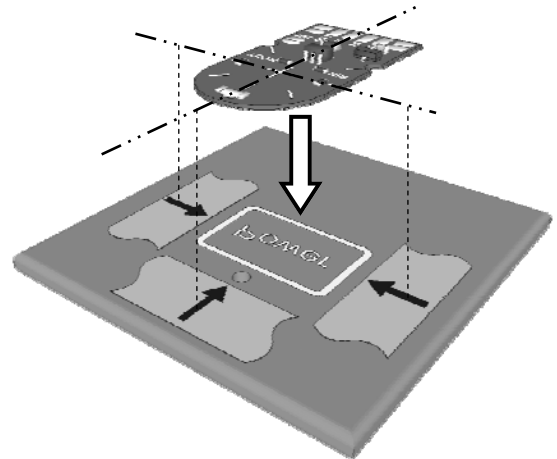
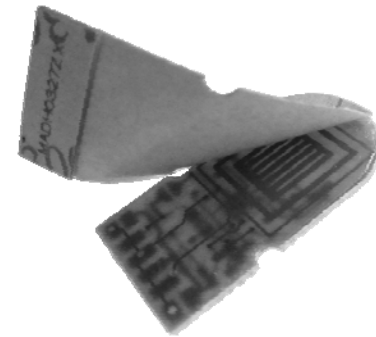
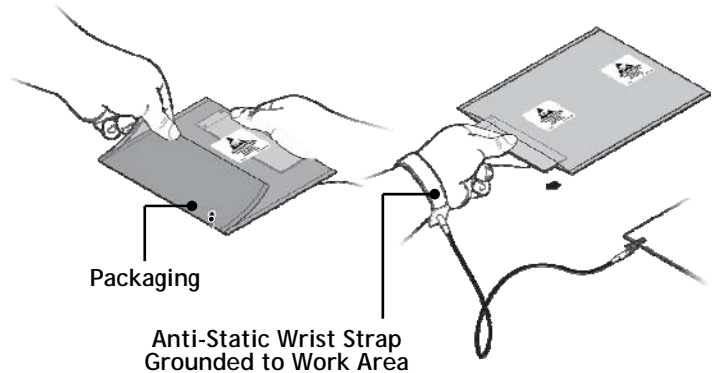
## Unpack and Apply TouchCells™

**CAUTION: Wear a grounded Anti-Static Wrist Strap before handling or unpacking TouchCells**

1. To protect TouchCells from electrostatic discharge (ESD) damage, leave them in packaging until ready to apply.
2. Using grounded anti-static precaution, remove TouchCell array from packaging.
3. Carefully peel back one corner of the adhesive liner and remove the liner from the array. Avoid touching the adhesive with your fingers or other objects. Hold the array **ONLY** by its edges. Minimize adhesive exposure to dust and debris.
4. Suspend the array over the substrate panel with its registration marks aligned to the reference marks previously placed on the masking tape.
5. Carefully lower the array onto the substrate panel. Without pressing down on the adhesive, you should be able to temporarily rest the array on the surface and check if the centerline marks on the array align with the reference marks on the masking tape. Since the adhesive wasn't compressed, you should be able to lift and reposition the array if necessary.

**CAUTION: In next step, do not exceed 15 psi of pressure.**

1. To permanently adhere the array to the substrate panel, apply even pressure of approx. 15 psi for 10 seconds with your fingertips in areas of the array void of any electrical components.
2. Once adhered, the arrays will be permanently mounted, allowing no further options to reposition. (Positive placement is critical, because maintaining contact between the TouchCell arrays and the substrate is required for proper operation.)



## Attach Wiring to Array

Electrical Connection:

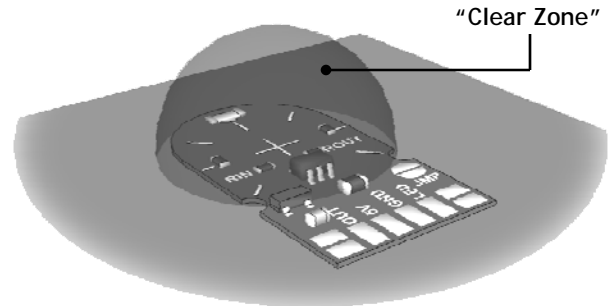
See Page 9 for Pin Layouts

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**NOTICE: To assure proper function, the Touch-Cell array should be installed with a "Clear Zone" (the size of a 10mm-radius sphere) behind and in-front of the electrode structure.**

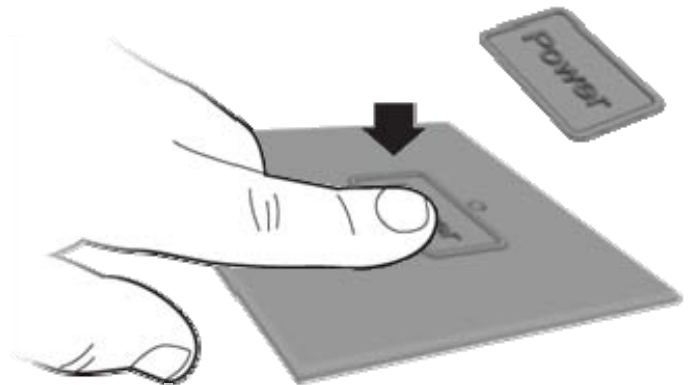
**The Clear Zone must be free of conductive objects such as wires, metal brackets, etc. because TouchCells can actuate from both front and back sides.**

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## Power-up your Modular Interface Panel

1. After making the appropriate electrical interconnects, apply power (5VDC +/-10%) to the individual modules.
2. Note: Power and ground can be shared in applications using multiple IntuiTek™ interface modules.
3. Confirmation Test: From the front surface of the substrate (panel), touch each individual switch, one by one, to make sure they are activating properly.
4. Note: Proper function can be determined by monitoring the corresponding output line of the individual key being activated, or by observing the LED Feedback Light if applicable.
5. Assembly is now complete.



## Trouble-shooting for IntuiTek™ Modular Interface

<p>The switch module will not stick to the back surface of the interface panel</p>	<p>The surface of interface panel substrate is rough, oily, or dirty. Or, the liner has not been removed from the adhesive on the IntuiTek™ module. The surface must be smooth with no texture. Clean a oily or dirty surface with isopropyl alcohol and allow it to evaporate before adhering the switch module. Remove the liner from the IntuiTek™ module before adhering it to the interface panel.</p>
<p>There is no output voltage when I activate the switch with my finger.</p>	<p>There is no supply voltage or an improper supply voltage on the appropriate module pin. The electrode structure has been misaligned with the switch button graphics on the front of the interface panel. The module has not been properly adhered to the interface panel surface with air bubbles present. The interface panel is thicker than recommended. Check that the supply voltage is 5VDC +/- 10% and that it is on the correct module pin per the pin layout diagrams in the IntuiTek™ Operators Manual. Make sure that the IntuiTek™ TouchCell™ electrode patterns are directly below the switch button graphics on the front of your interface panel. Review the installation instructions and make sure you have followed them to eliminate or minimize air bubbles between the module adhesive and your interface panel, using the IntuiTek™ Application tool. Check to make sure your plastic interface panel material is 2 mm thick +/- 0.125 mm or your glass interface panel is 4 mm thick +/- 0.25 mm.</p>
<p>There is an output voltage from the switch, but, the LED indicator or ring light will not light when I activate the switch with my finger.</p>	<p>You have no source voltage or an improper source voltage on the LED drive pin on the module connector or solder pads. The LED has been damaged by high voltage static electricity or lack of an external current limiting resistor. The module you have ordered is not equipped with an indicator LED or ring lighting. Check to make sure your external electronics are applying a proper voltage to the illumination pin on the IntuiTek module when the switch is activated. Check to make sure you have installed the module using an Antistatic protection grounded wrist strap and cable and that you have not used paper or plastic products to and adhere the module to the interface panel. Check your external current limiting resistor to make sure it limits the current to the LED at the specified maximum level at all supply voltages and ambient temperatures. Check the part number of the module you have installed to make sure it is equipped with a indicator LED or ring lighting LED and reflector.</p>
<p>Something seems to be activating the switches, even when I am not touching the surface of the interface pane.</p>	<p>A conductive material or object is within 10 mm of the back surface of the switch module. The voltage you are supplying to the interface module is greater than the specified 5.5VDC. Remove, relocate or reroute any cables or conductive objects within 10 mm of the back of the IntuiTek™ module. A supply voltage greater than 5.5VDC tends to make the switch more sensitive and may destroy the switch electronics. Make sure your supply voltage does not exceed 5.5VDC.</p>