Technical Data

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touchsensor™

A Methode Electronics Company

DESCRIPTION

TouchSensor offers the world's only Field-Effect switch - a digital, 5-volt switch that is software free. The switch is a low-impedance field-effect integrated circuit (IC) available in a 6 pin SOT package. The IC is used in combination with proprietary pad geometry and two resistors to form a TouchCell™.

When 5 volts is applied to the TouchCell™, an electric field is created. The field emanates through any dielectric substrate such as glass or plastic. When a conductive mass enters the field, the sensor detects the change and indicates an event has occurred. The input stimulus to the field can take the form of a human finger, metal, or liquid.

KEY FEATURES

- **Operating Voltage**
  5Vdc ± 10%
- **Operating Temperature**
  -40°C to + 120°C
- **Response Time**
  160 μseconds Typical
- **Current Consumption**
  16 μamps Typical
- **UL Recognition**
  UL File # E187820
  (Fail Safe Device)
- **Interface**
  DC or Matrix
- **Actuation**
  Adjustable Sensitivity
- **Actuation Area**
  Flexible - 14mm X 14mm Typical
- **Sense Through**
  Glass, Plastic (Any Dielectric)
- **IC Packaging**
  6 Pin SOT

OUTPUT CONFIGURATIONS

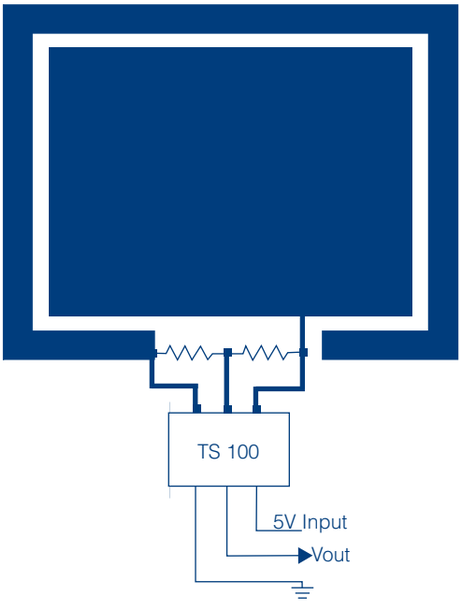
- **Active high**
- **Active low**

APPLICATIONS

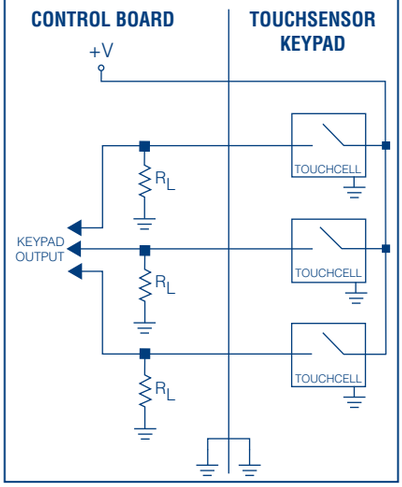
- **Human Touch - Keypads**
- **Fluid Level Sensing**
- **Position Sensing**

The TouchCell™

TS100 TOUCHCELL™



DC MODE

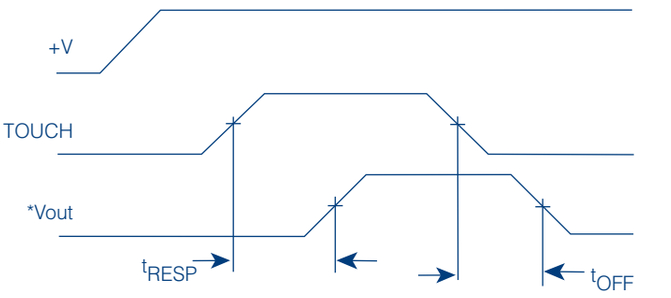


DC MODE ELECTRICAL CHARACTERISTICS

Parameter	Value			Units
	Min.	Typ.	Max.	
+V	4.50	5.00	5.50	V
Touchcell Current		16	30	µA
t_{RESP}	100		200	µS
t_{OFF}	100		200	µS
V_{OUT} *(RL=4.7K)	4.00			V

*Output current should be limited to no more than 10mA.

DC MODE TIMING DIAGRAM



*at TS100 output pin

The TS-100 Sensor is a low impedance field-effect switch that is used in combination with proprietary pad geometry to form a TouchCell™. Each TouchCell™ is comprised of three elements:

- A TS-100 sensor IC
- Two resistors for sensitivity setting
- Proprietary electrode structure

TouchSensor keypads consist of either single or multiple TouchCells™. These TouchSensor keypads are used to replace existing membrane or mechanical switches and their digital output signals offer easy integration.

Keypad Interface

Interfacing to a TouchSensor keypad is achieved via direct connect (DC Mode) or matrix/multiplexed connect (Strobe Mode). The interface mode is specified at design time. TouchSensor keypads with four or fewer TouchCells™ typically use DC mode as the preferred interface whereas higher pad count configurations use Strobe Mode. DC Mode and Strobe Mode configurations are detailed below.

DC Mode

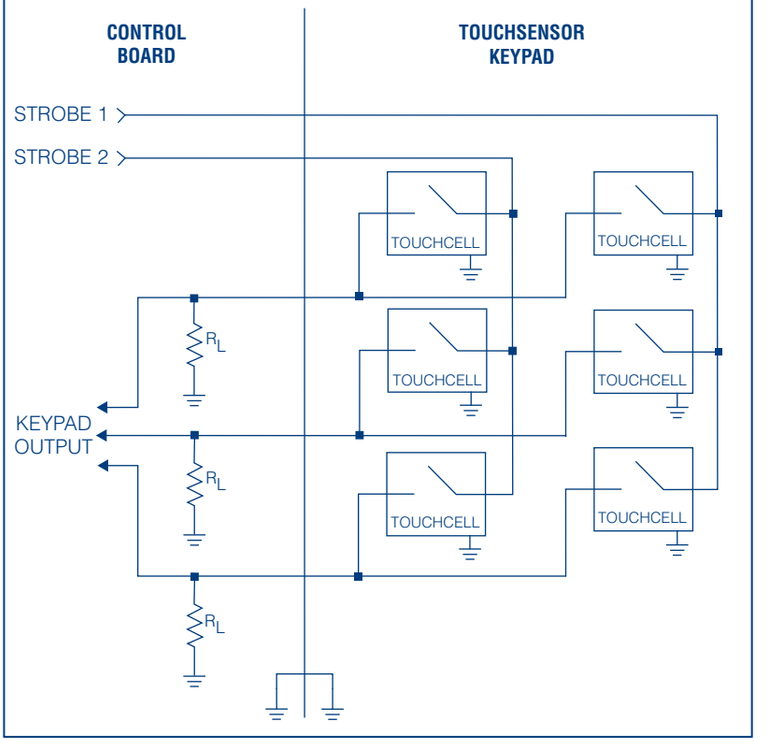
In DC Mode, continuous power is applied to the keyboard. All TouchCells™ are connected to the incoming power. Upon a touch condition, the output changes state. Multiple keys can be actuated at the same time, if required.

Strobe Mode

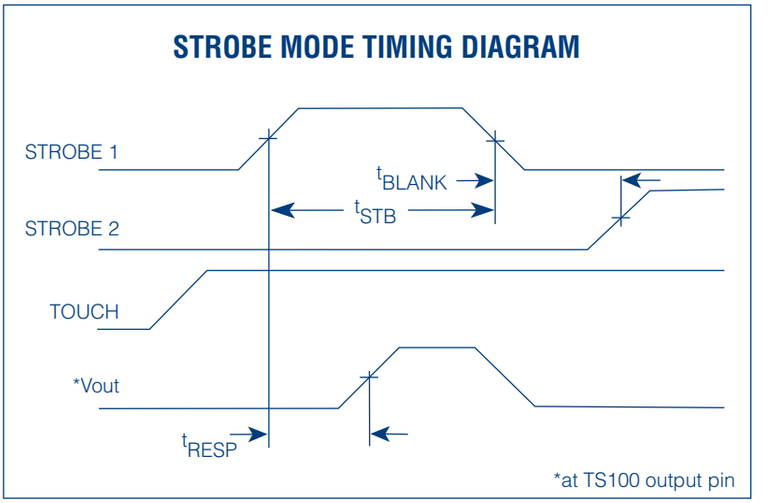
In Strobe Mode, a multiplexing scheme is used to interface to the keypad, similar to a conventional membrane matrix. TouchCells™ are arranged in row-column format. The TouchCells™ are scanned and their outputs are read using time-multiplexed scanning. A column is selected by setting the appropriate strobe line high, and the row outputs from the TouchCells™ are read at the return lines.

Power for the TouchCells™ is derived directly from the strobe signal. Considering the TouchCell's™ ~16μA current consumption and low load current, most microcontroller ports can drive the TouchCells™ without the need of special buffers or additional power supplies. The total load that a microcontroller port will have to drive is directly proportional to the number of TouchCells™ connected to that particular strobe line.

STROBE MODE



STROBE MODE TIMING DIAGRAM



STROBE MODE ELECTRICAL CHARACTERISTICS

Parameter	Value Min.	Typ.	Max.	Units
$+V_{STROBE}$	4.50	5.00	5.50	V
Touchcell Current		16	30	μA
t_{RESP}	110		260	μS
$^{*}t_{STB}$	300			μS
$^{*}t_{BLANK}$	50			μS
V_{OUT} **(RL=4.7K)	4.00			V

*Recommended **Output current should be limited to no more than 10mA.

Design Process

Design Process

Designing TouchSensor keypads using TouchCells™ is a simple step-by-step process:

1) ***Select Substrate***
TouchCells™ will work behind any non-metallic dielectric. Glass or plastic is the substrate of choice. Typical thickness is 4mm or less. Designs for thicker substrates are also available. Assistance with substrate selection is available. Typical TouchCell™ size is approximately 18mm X 18mm and can be placed as close as 5mm (edge-to-edge) from another TouchCell™. A clearance of 10mm or greater is also required directly behind the TouchCell™. Following these basic requirements allows for fast project development.

2) ***Select Interface Mode***
TouchCells™ can be easily implemented in Strobe Mode (Send / Receive Matrix) or Direct DC Mode, both with positive logic signals: 0 to 5 volts.

Constructing Keypads Using TouchSensor

A broad variety of panel substrates are available in the construction of TouchSensor keypads; the only requirement is that the chosen substrate material is dielectric in nature. Common examples include tempered glass and many varieties of plastic, including polycarbonate and ABS.

TouchSensor keypads must maintain intimate contact with the panel substrate. A pressure sensitive adhesive bonds the TouchSensor keypad to the dielectric substrate. Based upon the application, the adhesive is selected to meet the environmental requirements, including high and low temperature.

TouchSensor Technologies, LLC
203 North Gables Boulevard
Wheaton, IL 60187
Phone: 630.221.9000
Fax: 630.221.0737
Email – sales@touchsensor.com

TouchSensor Automotive Sales
24485 Evergreen Road
Southfield, MI 48075
Phone: 248.603.2124
Fax: 248.354.6667
Email – autosales@methode.com

touchsensor™

www.touchsensor.com
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