

MOLEX USER INTERFACE SOLUTIONS >

Versatile, Reliable Membrane Switches and Capacitive Solutions



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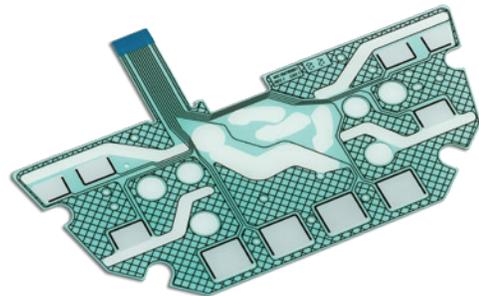
MEMBRANE SWITCHES AND CAPACITIVE SOLUTIONS >

Beyond interconnects, Molex is a global leader in manufacturing custom user interfaces, membrane switches and flex circuit solutions.

Molex delivers:

- Full staff of experienced electrical, software and mechanical engineers to collaborate with you on designs
- Design centers in the US and Asia
- Regionally located global sales force
- Manufacturing in US, Mexico and Asia
- UL qualified internal reliability lab
- 100% electrical inspection, testing and packaging
- Automated and semi-automated processes

With our history of reliable manufacturing and design, we are the ideal collaborator for professional grade products. Our team of experts will get your program from prototype to high-volume production on schedule.



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INNOVATIVE TECHNOLOGY WITH A GLOBAL REACH >

Membrane Switch and Control Panels

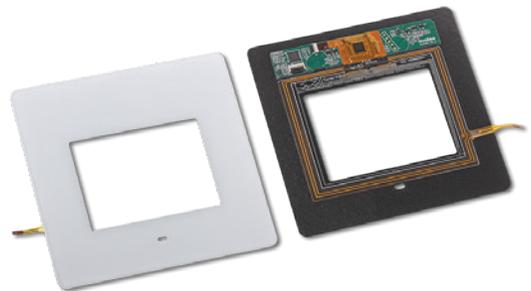
- Unlimited tactile and non-tactile contact configuration
- 3D membrane switches enhanced with rubber keypads
- Multiple backlighting and indication solutions
- Impressive array of decorative pieces for integration (metal, plastic bezel)

Capacitive Systems

- Electronic layout and stack up design services
- Optimize performance between touch sensor and micro controller
- Software and firmware development in-house
- Innovative backlighting techniques

Transparent Capacitive Sensors

- Ideal technology for backlighting capacitive touch keys
- Experts in PEDOT transparent sensor printing
- Experienced in mutual and self-capacitive layouts
- Integration into decorative plastic or glass





USER INTERFACE APPLICATIONS:

Appliance

Automotive interiors

Medical equipment

Industrial controls

Commercial handhelds

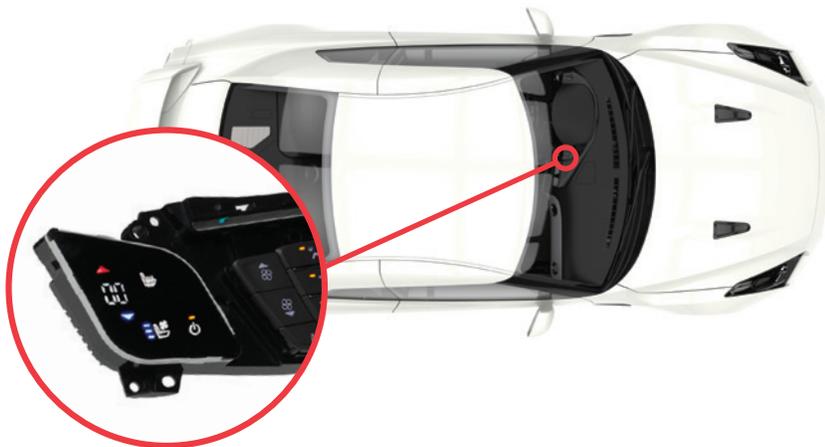


MOLEX DELIVERS:

Design engineering support

Proven Molex reliability

In-house value-add capabilities



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Physical

Substrate:

- **Polyester (PET)**
Transparent or white, 0.08mm to 0.18mm (.002" to .05mm) thick
- **Polyimide and FR4**
Various thicknesses available, 0.03mm (.001") standard
- **Thermoplastic Polyurethane (TPU) Non-Woven Materials**
- **PMMA**
- **Glass**

Conductive Ink:

- **Silver and Silver Blends**
- **Carbon Ink**
- **PEDOT**

Component Attachment

Component Types on PET:

- **SMD**
LEDs, resistors, capacitors, diodes, phototransistors
- **7-Segment Displays**
- **Microprocessors**
QFN, QFP, SU

Minimum Package Size

- **SMD**
0402 on PET
0102 on PCB / FPC
- **Microprocessors**
0.5mm pitch leads

Membrane Switch Options

Various dome sizes and forces from qualified vendors

Molex In-House Metal Domes

Size	Force
12.00mm (.472")	405g
12.00mm (.472")	240g
9.00mm (.354")	250g

Printing Capabilities

- **Panel Printing Maximum**
749mm by 1054mm
(29.5" by 41.5")
- **Roll-to-Roll Printing Maximum**
18" web, 21" repeat max

Trace Pitch Capabilities

- **Lines** 0.1mm (0.004")
- **Spaces** 0.1mm (0.004")

Circuit Construction:

- **Screened Crossover Circuit**
2 insulated conductors on same side
- **Printed Through Hole**
Double-sided printed circuits with poke through vias
- **Print Registration Tolerances**
0.150mm (.006")
print pass-to-print pass

Note: Tighter tolerances upon request

Die-Cut Capabilities

Die-Cut Type	Die-Cut to Print Tolerance
Hard Tool:	± 0.13mm (.005")
Steel Rule Die:	± 0.38mm (.015")

Steel Rule Die-Cut Tolerances

Overall Size:	± 0.38mm (.015")
Hole Diameter:	± 0.25mm (.010")
Hole Location:	± 0.38mm (.015")
All Cutouts:	± 0.38mm (.015")

Note: Size and material dependent

Backlighting

- **Light Guide Films**
- **Acrylic Light Guides**
- **Fiber Optics**
- **Indication LED**
- **Alternative Lighting Techniques**

Electrical

- **Circuit Resistance**
100 Ohms maximum, may vary depending on circuit configuration
- **Durability**
Tactile - 1 million operations
Non-Tactile - 5 million operations
- **Contact Bounce**
5 milliseconds typical
- **Insulation Resistance**
100 Megohms initial between adjacent traces

Environmental

These parameters may vary depending on specific switch configuration and application requirements

- **Operating Temperature**
-40 to +70°C typical (+85 and +105°C constructions available)
- **Storage Temperature**
-40 to +85°C typical (+85 and +105°C constructions available)
- **Humidity**
Up to 90% RH non-condensing, per MIL-STD-202F, Method 103B, Condition A*
- **Thermal Aging**
96 hours at +70°C, then 96 hours at -40°C
- **Thermal Shock**
Per MIL-STD-202F, Method 107D.
5 cycles of -40°C for 30 minutes, then +70°C for 30 minutes
- **Silver Migration**
3 cycles of 4 hours in +45°C at 85% RH, then cooled to +25°C for 4 hours with 5V DC applied

*After test, parts must meet electrical characteristics as specified above

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The Molex Approach

At Molex, we take a multidimensional approach to develop complete, integrated solutions that turn your ideas into reality. With the industry's broadest line of printed electronics and the expertise to work through your mechanical rigors, we can advise you on the best fit for your needs, balancing cost, performance, durability, weight and other requirements.

Learn whether a Molex user interface solution is right for your end application, and start designing your solution today at www.molex.com/en-us/products/printed-circuit-solutions/user-interface.



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