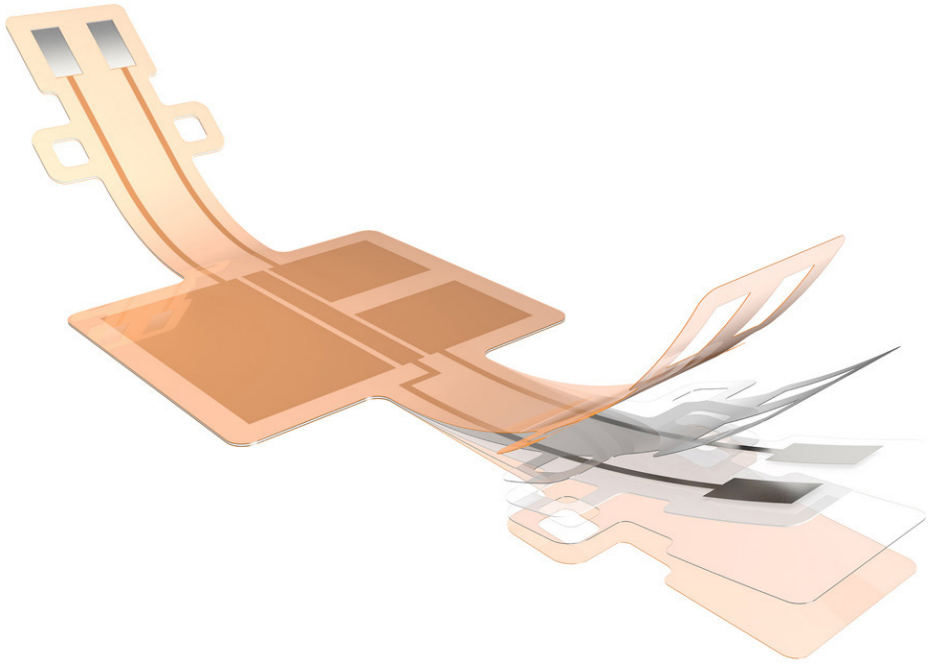
HeatSeal™ Technology



Reliable Adhesive Solutions for Critical Applications.

Protecting printed electronics from environmental factors such as water, moisture, and chemical ingress is critical to reliability. As conventional pressure-sensitive adhesives (PSA) often cannot withstand these factors, $e_2$ip technologies offers an innovative solution, the HeatSeal™ protective barrier.

The HeatSeal™ protective barrier thermally bonds printed electronic layers together, resulting in exceptional lamination strength and protection for robust printed electronics and membrane switches. For high-reliability applications, HeatSeal™ is easily combined with moisture barrier materials to yield a sealed and protected flexible circuit.

$e_2$ip technologies also offers optional graphic layer HeatSeal™ bonding and HeatSeal™ graphic layer to bezel bonding. A 100% HeatSeal™ bonding system solution offers the highest level of environmental protection.

Applications

- Printed Electronics
- Membrane Switches
- Flexible PTC Heaters
- Silver Ink Flexible Circuits

Key Features & Benefits

- Ingress Protection
- Moisture Migration Protection
- Environmental Robustness
- Impervious to Chemicals

HeatSeal™ Types Available

Extreme Environment HeatSeal™ Bonding Adhesive

This liquid HeatSeal™ system is applied with an additive screening process. Additive processes have little waste and many subtractive converting processes are eliminated.

As a result, designs that incorporate this process option are lower in cost but still have the high HeatSeal™ reliability. $e_2$ip technologies has developed this process for many customers with end products used in the aerospace, medical, white goods, industrial control, and automotive industries. Primarily used for bonding switch circuit layers.

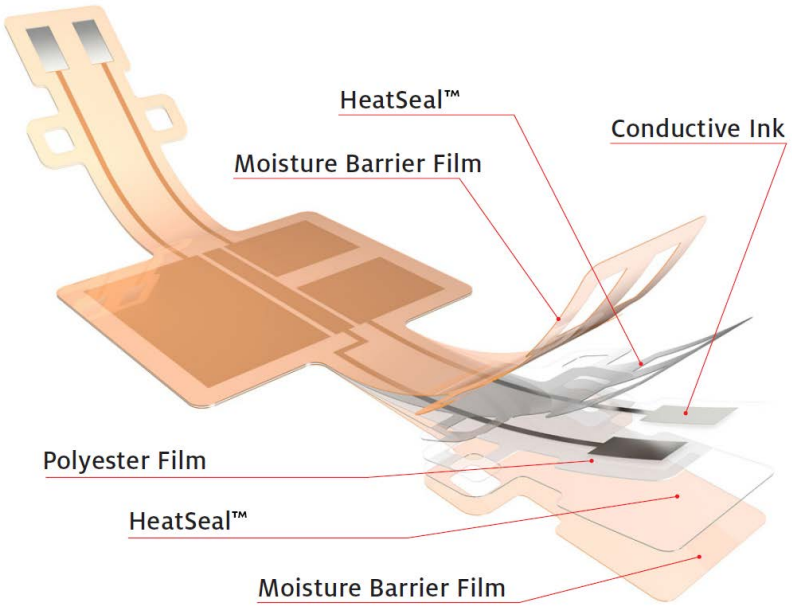
HeatSeal™ Spacer

This HeatSeal™ Spacer version uses subtractive processes from rolls that are manufactured by $e_2$ip technologies and subsequently converted using die cutting, laser and slug waste removal processes. The thicknesses available include .003", .005", .008", .010", and .013".

The HeatSeal™ Spacer uses a polyester (PET) carrier to vary the thicknesses. A thin ~.0015" HeatSeal™ coating is applied to each side of the PET carrier. $e_2$ip technologies recommends this material for all HeatSeal™ applications and designs. Used heavily for designs with metal domes, graphic emboss, embedded components, bezel bonding, and flexible or PCB circuit bonding. This material is used for many medical, industrial control, white goods, gas pump, aviation, military, food preparation, and other harsh environment applications.

Moisture Barrier HeatSeal™

For extreme environments with continuously high humidity and temperatures, $e_2$ip technologies offers an optional Moisture Barrier HeatSeal™ material that offers exceptional moisture barrier performance.



All basic polyester materials eventually allow moisture to pass through the material when continuously exposed to high humidity and temperature. With an exceptional MVTR tested at <.005g/ (m^2*day) this HeatSeal™ version can be designed into a membrane switch as an extreme moisture barrier bonding.

This material is currently used in Medical and Printed electronics applications but can be also designed for other harsh environment applications.

Flexible HeatSeal™ Coverlay

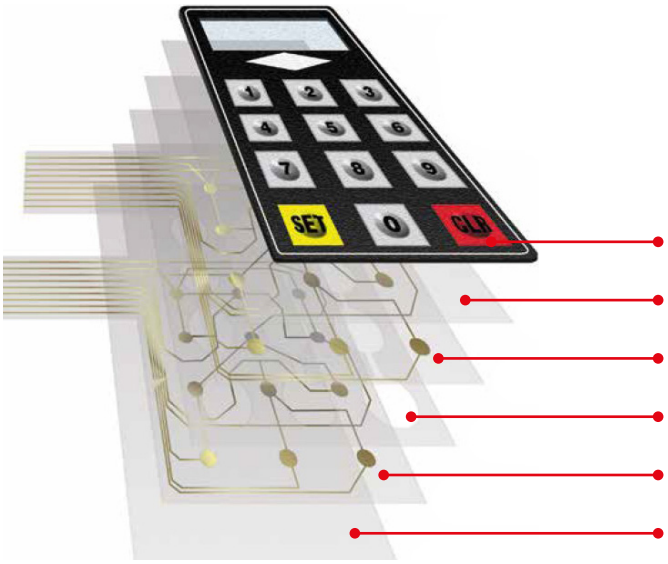
$e_2$ip technologies manufactures a .003" thick carrier material with HeatSeal™ applied to one side. This coverlay is commonly used to protect the circuitry on the membrane switch's flexible tail.

The flexible HeatSeal™ coverlay is superior to traditional screened dielectric in providing robust protection while not inducing cracks and allowing silver migration between circuits.

Environmental Specifications

Specification	Typical Value	Test Method
Operating Temperature	-40°C to 65°C Higher Temperature Application Designs Available	ASTM F1596
Storage Temperature	-40°C to 85°C	ASTM F1596, Level 1
Humidity	95% RH Non-Condensing	ASTM F1596, Level 1
Ingress Protection	Pass Both IP67, IP68 Designs Available	IEC 60529
Water Vapor WVTR	< 1 g/m2/day Designs Available	ASTM F1249
Accelerated Aging	85C @ 85% RH, Duration 1000 hrs	ASTM D1876
Salt Atmosphere (Corrosion) Testing	Pass	MIL-STD-202G Method 101E Condition D
Chemical / Solvent Resistance Pass	Pass	ASTM F1598
Water Submersion	Pass	ASTM F1895

GMW14445 Certified – Sunscreen and Insect Repellant (DEET) Resistance



HeatSeal™ Bonding Adhesive Location Options

Gaphic Overlay

Graphic Adhesive (HeatSeal™ or PSA)

Top Switch Circuit Layer

HeatSeal™ Spacer

Bottom Switch Circuit Layer

Rear Adhesive (HeatSeal™ or PSA)

Transforming the surfaces we touch in our everyday lives.

For more information, speak with a specialist at e$_2$ip technologies.

We're always looking forward to hearing from you!

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