

SENSOINK HIGH END POLYMER PASTE SYSTEMS

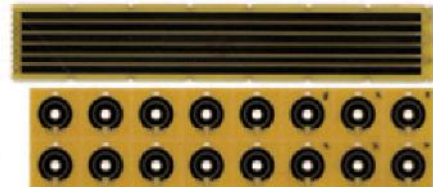
Hoffmann + Krippner presents with Sensolnk an innovative solution based on printed polymer pastes. Sensolnk, with its polymer thick film technology offers a new way for printing potentiometers, resistors, switches or keyboard contacts on circuit boards or electronic components. Sensolnk offers the opportunity to realize quick and easy individual specifications, without any loss of quality.

Besides central features such as the excellent linearity, extreme durability and high temperature stability when used as a potentiometer, high voltage or power resistor, the integration Sensolnk offers an enormous potential of financial savings compared to conventional components.

Open potentiometers as stand-alone solution

So far, printed open potentiometers are mainly used as a stand-alone solution. This generally means that potentiometers are being printed on ceramic material, circuit board, Kapton film or on other materials and a specific wiper (defined by shape and material) is used as collector. If operators are proficient in interacting with the potentiometric sensor and the dynamic contact (wiper), this leads to excellent results:

- Signal enhancement = 1; output signal equates input signal
- Passive system without any negative electromagnetic effects (Electromagnetic compatibility)
- Only two components are required for signal transformation; a printed potentiometer track on a carrier material (e.g. FR4 or PET foil) and a conductive wiper
- Wear free application as the result of the right tripological matching of the polymer layer and the wiper



Users should use professional advice for their specific applications. Optimal results can only be achieved by adjusting the wiper to the thick film polymer paste.

Polymer-resistance tracks on printed circuit boards

The combination of open potentiometers on printed circuit boards was used so far as follows: a potentiometer, printed on a separate substrate, was attached after the assembly process of the circuit board. With Sensolnk this process can be simplified considerably. The potentiometer is printed directly onto the circuit board. After that the circuit board is equipped. Even repeated soldering processes (reflow or wave soldering) are possible.

This method comprises the same characteristics as printed potentiometers with the additional benefit that reduced process steps lead not only to reduced prices but as well to a reduced error rate (improved MTBF).

Flexible potentiometer on radial surfaces

For applications on radial surfaces (tubes) usually Kapton foils are used. Hoffmann + Krippner has developed a paste formula that allows to print abrasion and chemically resistant resistive paths on inexpensive PET. In order to achieve these specifications a polymer thick film paste, already in use by H+K, was modified to match the temperature level of the PET foil that the paste can be completely cross-linked and hardens. In terms of abrasion resistance and chemical resistance this technology is comparable to conductive polymers on printed circuit boards.

This new potentiometer option allows new and interesting possibilities for a variety of industrial applications.



Wiper technology

Open potentiometers, printed on FR4 or PET, require conductive wipers. The lay-out of the wiper depends on the specific application, the resistor material and design. Mostly the so-called scoop wipers are used, but more and more they are replaced by scratch wipers. Scoop wiper or scratch wiper, in any case the applications determine the shape and material of the wiper and should be selected in cooperation with your H+K technicians.

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SENSOLNK SPECIFICATION OVERVIEW

Hoffmann + Krippner presents with Sensolnk a new generation of printed polymer thick film paste systems. For more than 40 years we develop and manufacture products in the areas of membrane keyboards, ultra-flat membrane potentiometers and complex input systems. This professional know-how enables us to meet the highest standards in terms of quality and functionality for high end polymer paste systems.

Sensolnk Potentiometer

Sensolnk Potentiometer is the advancement of the established conductive plastic potentiometer. We print a polymer layer on materials such as FR4, Kapton, and PET. Hoffmann + Krippner offers to linearize the potentiometers on request.

Tolerances: Sensolnk potentiometers allow standard resistor tolerances of $\pm 30\%$. Customized solutions with lower tolerances are possible upon request.

Linearity: Depending on their specific design, Sensolnk Potentiometers have a default linearity between 0,5% and 4%.

Sensolnk Resistors

Sensolnk is also suitable for the use as resistor on internal or external layers. Compared to common resistors Sensolnk provides numerous advantages. By integrating/printing the resistors directly on the material, Sensolnk simplifies manufacturing processes and offers tremendous potential for space and weight savings. In addition, by using special methods resistance tolerances can be reduced further to meet customer-specific requirements.

Tolerances: Sensolnk resistors have a standard resistance tolerance of $\pm 30\%$. Customized solutions with resistance tolerances to $\pm 5\%$ are possible upon request.

Sensolnk Switches

Sensolnk switches are printed directly onto circuit boards to achieve the optimum utilization of space. An intelligent circuit layout and a high reliability system are the ideal preconditions for a use in systems where limited space specifies the design.

Sensolnk Keyboard contacts

Sensolnk keyboard contacts offer the use of innovative printing technology for long life and reliable systems with the highest quality standards. Due to the durability of the polymer paste systems against external influences Sensolnk provides the ideal solution for the use as keyboard contacts and contact surfaces in rough environments.

Common technical parameters for Sensolnk potentiometer

Resistor length	> 2 mm	
Resistor width	> 1,5 mm	
Overlap silver to copper	\geq 0,25 mm	
Overlap resistor to silver	\geq 0,15 mm	
Solder mask clearance	\geq 0,25 mm	
Wiper current (short time)	< 100 mA	
Operating temperature	-40°C / 150°C	-40°F / 257°F

Common technical parameters for Sensolnk resistors on external layers

Resistor length	\geq 2 mm
Resistor width	\geq 1,5 mm
Overlap silver to copper	> 0,25 mm
Overlap resistor to silver	> 0,15 mm
Solder mask clearance	> 0,25 mm

Common technical parameters for Sensolnk resistors on internal layers

Resistor length	> 2 mm
Resistor width	> 1,5 mm
Overlap copper to resistor	> 0,15 mm
Overlap resistor to copper	\geq 0,25 mm

Common technical parameters for Sensolnk switches

Overlap carbon to copper	> 0,15 mm
Distance carbon coatings	> 0,5 mm
Solder mask clearance	\geq 0,25 mm
Distance carbon to dielectric	\geq 0,15 mm
Dielectric width	\geq 0,3 mm

Common technical parameters for Sensolnk keyboard contacts

Copper width	> 2 mm
Overlap carbon to copper	> 0,15 mm
Distance carbon coatings	\geq 0,5 mm
Solder mask clearance	\geq 0,25 mm
Copper thickness	\leq 50 μ m