Metalon® PSI-211 Conductive Screen Print Ink

Product Description

PSI-211 is a water-based, silver nanoparticle screen print ink which is designed to produce cured features with high electrical conductivity, low surface roughness, and good adhesion on a wide range of substrates. When compared to polymer thick film conductive inks, cured films of PSI-211 achieve equal sheet resistance values at lower thickness. As a result, a noticeable savings in material cost is attained. PSI-211 can be printed on plastics, paper, glass, and transparent conducting oxides (TCO). It is used in printed electronics applications which include antenna, RFID, sensors, and heaters.

Key Benefits

- High electrical conductivity at low cured film thickness for material cost savings
- Good printability with low surface roughness
- Excellent adhesion on plastics, for example, treated polyester, polyimide, polycarbonate, and polyurethane
- Good adhesion on glass and transparent conducting oxide (TCO) surfaces
- Good flexibility and crease resistance on plastics and paper
- Good water and alcohol resistance
- Minimal volatile organic compounds (VOCs)
- Easy clean-up with a solution of particle-free detergent and water

Typical Formulation Properties

Silver content (wt. %)	42 (± 2)
Density (wet)	1.4 - 1.6 g / mL
Viscosity @ $10s^{-1}$	3500 - 6000 cP
Viscosity @ $100s^{-1}$	1500 - 3000 cP
pH	5.80 ± 0.05
Shelf life with refrigeration	> 6 months (will need pH adjustment)

Thermal Processing Conditions and Properties of printed films on selected substrates[1]

	Melinex ST505, a type of treated polyester (PET)		
Cure temperature (˚C)	80	100	140
Cure time[2] (min)	≥ 15	≥ 5	≥ 5
Weight resistivity[3] (gΩ / m²)	0.52 (3.1x bulk Ag)	0.51 (3.1x bulk Ag)	0.46 (2.8x bulk Ag)
Volume resistivity[4] (μΩ cm)	10 (6.5x bulk Ag)	8.0 (5.0x bulk Ag)	7.0 (4.4x bulk Ag)
Sheet resistance at 1 mil (mΩ / square)	4.1	3.2	2.8
Cross-cut tape test (ASTM 3359 method B)	5B	5B	5B

Metalon® Conductive Inks for Printed Electronics

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	Kapton HN, a type of polyimide			
Cure temperature (˚C)	140	200	250	275
Cure time[2] (min)	≥ 5	≥ 5	≥ 5	≥ 5
Weight resistivity[3] (gΩ / m²)	0.44 (2.6x bulk Ag)	0.43 (2.6x bulk Ag)	0.31 (1.8x bulk Ag)	0.27 (1.6x bulk Ag)
Volume resistivity[4] (μΩ cm)	7.0 (4.4x bulk Ag)	6.3 (4.0x bulk Ag)	4.6 (2.9x bulk Ag)	4.2 (2.7x bulk Ag)
Sheet resistance at 1 mil (mΩ / square)	2.8	2.5	1.8	1.7
Cross-cut tape test (ASTM 3359 method B)	5B	5B	5B	0B

	Glass			
Cure temperature (˚C)	100	140	200	250
Cure time[2] (min)	≥ 30	≥ 5	≥ 5	≥ 5
Weight resistivity[3] (gΩ / m²)	0.60 (3.6x bulk Ag)	0.54 (3.2x bulk Ag)	0.47 (2.8x bulk Ag)	0.42 (2.5x bulk Ag)
Volume resistivity[4] (μΩ cm)	9.0 (5.7x bulk Ag)	7.6 (4.8x bulk Ag)	7.0 (4.4x bulk Ag)	6.1 (3.8x bulk Ag)
Sheet resistance at 1 mil (mΩ / square)	3.5	3.0	2.8	2.4
Cross-cut tape test (ASTM 3359 method B)	5B	5B	5B	0B

[1]The theoretical wet ink thickness for all prints was 51 μm. All prints were cured in a convection oven.
[2]All tabulated cure times (for a given cure temperature) are shown as a range of times. This is indicated by the use of the "≥" sign. In this range of cure times, the tabulated values of weight and volume resistivity, sheet resistance at 1 mil, and cross-cut tape test result are the same.
[3]The number in brackets for each entry is the weight resistivity value divided by the weight resistivity of bulk silver (at 20˚C).
[4]The number in brackets for each entry is the volume resistivity value divided by the volume resistivity of bulk silver (at 20˚C).

Some recommended Curing Tools

- Convection ovens
- Forced-air drying ovens
- PulseForge® tools (https://pulseforge.com/)
- Near-IR (infrared) heaters

General Processing Requirements to achieve consistent printing and Clean-up Solution Composition

- Relative humidity near screen-printing apparatus: > 50 %
- Type of screen-printing mesh: stainless steel and polyester
- Type of screen emulsion: water-compatible
- Clean-up solution is 1 part per volume of a particle-free detergent and 19 to 20 parts per volume of deionized water

For more information about this ink, please contact us at info@novacentrix.com