

ACI Data Sheets

Stretchable Screen-Printed Inks & Pastes
SS1109, SC1502, and SI3103 Combination



SS1109

Stretchable Printed Silver Conductor

Product Description

ACI SS1109 is a silver-filled conductor for printed interconnects for devices on elastomeric substrates. After drying, the ink has excellent conductivity and offers excellent elongation and flexibility. SS1109 has been formulated for superior adhesion to thermoplastic urethanes (TPU). It is compatible with ACI's other stretchable materials. SS1109 is used in stretchable electronics and e-textile applications to power components/devices, and carry signals from embedded devices and sensors. Contact our engineering team for application-specific questions.

Product Benefits

- Superior stretch performance on TPU offering elongation greater than 200%
- Excellent resistivity and rapid return after strain
- Excellent adhesion to TPU
- Washable with ACI stretchable insulator
- Compatible with other products in ACI's stretchable electronics platform

Typical Performance

Volume Resistivity 135°C for 15 min in box oven	<0.017 Ω /square/mil <4.5.0 x 10 ⁻⁵ Ω .cm
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Maximum Elongation ¹	>200%
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Adhesion ²	5B
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¹ 2 mm wide trace cured on TPU substrate

² ASTM D3359 Method B

Typical Properties as Supplied

Physical State	Paste
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Color	Silver
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Viscosity ³	40 Pa·s
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Density	2.39 g/mL
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Percent Solids ⁴	69%
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Shelf Life at 20°C	6 Months
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Typical Processing Parameters

Deposition Methods	Screen printing, syringe dispense/direct write
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Curing Time and Temperatures	5 min box oven $\geq 135^\circ\text{C}$ 5 min in industrial conveyor oven at $\geq 120^\circ\text{C}$
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Recommended Screen Meshes	200/230 stainless steel
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Recommended Cured Thickness ⁵	10-20 μm
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Coverage	9/11 m ² /kg
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Mixing	Slow thorough mix, avoid inducing bubbles, fixed spatula in rotating jar ideal ⁶
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Thinner/Diluent	SE8106
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Clean Up Solvents	Acetone, MEK, and similar solvents
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³ Anton Paar MCR302 10⁻¹ at 25°C

⁴ 150°C for 120 minutes in box oven

⁵ Double print wet on wet or dry can be used to build thickness

⁶ AT-LM4 Stirring Type Mixer (E211) recommended

SC1502

Stretchable Printed Carbon Conductor

Product Description

ACI SC1502 is a carbon-filled conductor for printed circuitry and devices on elastomeric substrates. It can be dried at low temperatures to accommodate sensitive substrates and devices. After curing, the ink has good conductivity and offers excellent elongation and flexibility. SC1502 has been formulated for superior adhesion to thermoplastic urethanes (TPU). It is compatible with ACI's other stretchable materials and can be printed over the silver grades in sensor applications to limit silver migration.

Product Benefits

- Superior stretch performance on TPU offering elongation greater than 200%
- Excellent resistivity and rapid return after strain
- Excellent adhesion to TPU
- Low cure temperature (80°C) is possible for temperature sensitive materials
- Compatible with other products in ACI's stretchable electronics platform

Typical Performance

Volume Resistivity 120°C for 15 min in box oven	<200 Ω /square/mil < 0.5 Ω ·cm
Maximum Elongation ¹	>200%
Adhesion ²	5B

¹ 2 mm wide trace cured on TPU substrate

² ASTM D3359 Method B

Typical Properties as Supplied

Physical State	Paste
Color	Black
Viscosity ³	37 Pa·s
Density	1.08 g/mL
Percent Solids ⁴	20%
Shelf Life at 20°C	6 Months

Typical Processing Parameters

Deposition Methods	Screen printing, syringe dispense/direct write
Curing Time and Temperatures	15 min box oven $\geq 120^\circ\text{C}$ < 5 min in industrial conveyor oven at $\geq 120^\circ\text{C}$
Recommended Screen Meshes	200/230 stainless steel
Recommended Cured Thickness ⁵	6-12 μm
Coverage	43/33 m ² /kg
Mixing	Slow thorough mix, avoid inducing bubbles, fixed spatula in rotating jar ideal ⁶
Thinner/Diluent	SE8106
Clean Up Solvents	Acetone, MEK, and similar solvents

³ Anton Paar MCR302 10s⁻¹ at 25°C

⁴ 150°C for 120 minutes in box oven

⁵ Double print wet on wet or dry can be used to increase deposition thickness

⁶ AT-LM4 Stirring Type Mixer (E211) recommended

SI3104

Stretchable Printed Insulator

Product Description

ACI SI3104 is a screen printable, thermally cured ink that is stretchable when cured and compatible with ACI's stretchable inks. SI3104 can be used as an insulator and/ or crossover dielectric. When cured, the ink displays exceptional durability, excellent flexibility, and high insulation resistance. SI3104 has excellent adhesion to TPU, and is fully compatible with ACI's suite of products engineered for stretchable and flexible electronics.

Product Benefits

- Excellent adhesion to elastomeric substrates
- Maintains flexibility and stretchability to more than 100% elongation
- Good dielectric breakdown strength
- Fully compatible with ACI's stretchable inks and conductive adhesives

Typical Performance

DC Breakdown ¹	250 V/mil
Adhesion ²	5B
Maximum Elongation	100%

¹ Three layers printed with 180.0018 Stainless Steel mesh (ACI DC Voltage Breakdown Test)

² Method based on ASTM D3359 Method B tested on 0.005" Melinex® ST506 PET

Typical Properties as Supplied

Physical State	Paste/Ink
Color	Translucent White
Viscosity ³	33 Pa·s
Density	1.15 g/mL
Percent Solids ⁴	32%
Shelf Life at 20°C	12 Months

Typical Processing Parameters

Deposition methods	Screen printing		
Ideal Curing Time and Temperatures	5-15 min in box oven at 135°C 5 min in industrial conveyor oven at 135°C		
Recommended Screen Mesh Range TPI/Wire Diameter	150/0.0026" – 200/0.0016" Stainless Steel 110/43µm – 140/55µm PET		
Emulsion Over Mesh (EOM) Thickness	15 µm		
Squeegee Durometer	70A – 80A		
Recommended Meshes - Theoretical Dry Film Thickness - Coverage	150/0.0026"	14 µm DFT	12 m2/kg
	200/0.0016"	9 µm DFT	15 m2/kg
	110/43µm	14 µm	12 m2/kg
	140/55µm	10 µm	15 m2/kg
Recommended # Layers	3		
Mixing	Slow thorough mix, avoid inducing bubbles, fixed spatula in rotating jar ideal ⁵		
Thinner/Diluent	SE8106		
Storage	In sealed container in cool dry location		
Clean Up Solvents	Acetone, MEK, and similar solvents		

³ Measured on Anton Paar MCR302 at 10⁻¹ sec shear rate at 25°C after pre-shearing at 100⁻¹ sec for 5 min

⁴ 150 °C for 120 minutes in box oven

⁵ AT-LM4 Stirring Type Mixer (E211) recommended



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Caution

Proper industrial safety precautions should be exercised in using these products. Use with adequate ventilation. Avoid prolonged contact with skin or inhalation of any vapors emitted during use or heating of these compositions. The use of safety eye goggles, gloves or hand protection creams is recommended. Wash hands or skin thoroughly with soap and water after using these products. Do not eat or smoke in areas where these materials are used. Refer to appropriate MSDS sheet.

Disclaimer

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