

DATA SHEET



Cabot Conductive Ink CCI-300

Printed Electronic Materials

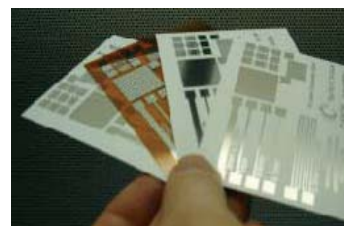
Product Description

Cabot Conductive Ink, CCI-300, is a general-use ink designed for piezoelectric inkjet printing of conductive features on a variety of substrates. CCI-300 is comprised of engineered nanoparticles in a liquid vehicle. Cabot's CCI-300 ink contains surface modified ultra-fine silver nanoparticles that are engineered for reliable inkjet printing to form high-resolution, low resistivity conductive features on a variety of substrates. Because metal nanoparticles have reduced melting and sintering temperatures as compared to

their micron-sized counterparts, CCI-300 can be processed at temperatures as low as 100°C. This enables printing of highly conductive metal features on low cost substrates such as paper, FR4, polyester, polyimide, display glass, and silicon.

After inkjet printing, a low-temperature sintering step provides a continuous metal conductor, providing a percolation channel for the conduction of electrons throughout the material without obstacles. This is radically different from the traditional polymer thick film material

approach, which uses metal flakes. Not only are these flakes hard to print, they are also inferior in terms of their electrical performance which suffers from an unreliable contact resistance between touching flakes.



Inkjet printed test pattern on various substrates

Typical Ink Properties

Viscosity (cP) at 22°C	11-15
Surface tension (mN/m) at 25°C	30-33
Silver Solid loading (wt%)	19-21
Density g/ml	1.23-1.24
Vehicle	Alcohol-based
Head compatibility	Piezo (e.g. Spectra SE128, Dimatix DMC11610, Konica Minolta KM512MN)
Stability at room temp.	> 6 months



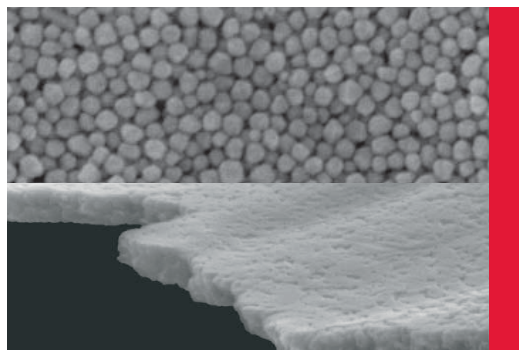
Inkjet printing of an electronic test pattern

Cabot Printed Electronic Materials

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Typical Performance Data

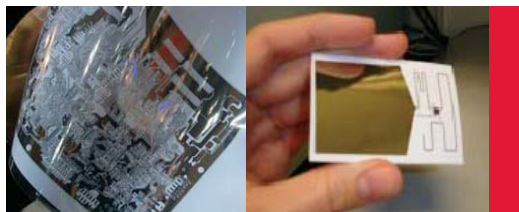
Curing temperature (°C in Air)	100–350
Curing time (min.)	1–30
Bulk resistivity ($\mu\Omega\cdot\text{cm}$)	4–80
Fired print thickness (μm @ 500 dpi)	0.4
Sheet resistivity ($\text{m}\Omega/\square$ @ 0.4 μm)	75–1000



SEM images of a layer of printed ink, before and after a 10 minute cure at 180°C

Applications

Given its excellent performance at low temperature, Cabot PEDs Inkjet Silver Conductor, CCI-300 is ideally suited for applications such as printed RFID antennas and tags, digitally printed multi-layer circuit boards, printed membrane keyboards, smart packages, security devices, and “disposable electronics”. This ink can also be used to print interconnects, data lines and bus bars for applications in printed logic and printed active and passive matrix backplanes for applications such as polymer electronics, OLED displays, TFT-LCDs, plasma displays and solar cells.

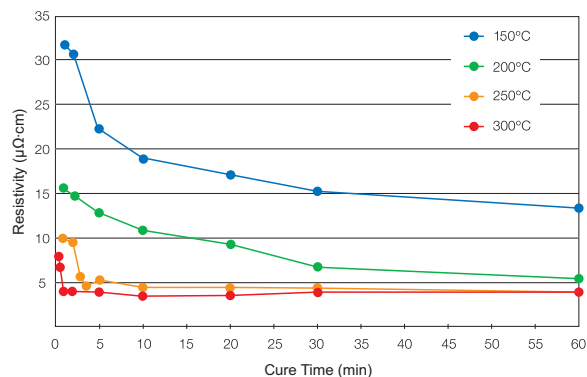


Inkjetted flexible substrates

Inkjet printed RFID tag

Typical Performance Attributes

- Good adhesion to polymer substrates such as FR4 and PET at curing temperatures below 200 C (passes ASTM D3359 – 02 adhesion test)
- Good adhesion to glass and ITO at curing temperatures above 250°C.
- Low resistivity achieved after very short curing times enabling significant reduction in tact time in a manufacturing process



Electrical performance versus cure time at temperature in air

PRODUCT REGISTRATION

Australia: AICS (Australian Inventory of Chemical Substances): All components are listed on or exempt; **Canada:** CEPA (Canadian Environmental Protection Act): All components are listed on the DSL or NDSL or are exempt from listing under the CEPA; **China:** Chinese Inventory: All components are listed on or exempt in the Chinese Inventory; **Europe (EU):** EINECS (European Inventory of Existing Commercial Chemical Substances): All components are listed on or exempt from listing under EINECS or have been notified to ELINCS; **Japan:** ENCS (Japanese Existing and New Chemical Substances): All components are listed on or exempt; **Korea:** KECL (Korean Existing chemicals List): All components are listed on or exempt; **New Zealand:** HNSO (New Zealand Hazardous Substances and New Organisms Act): All components are listed on or exempt; **Philippines:** PICCS (Philippine Inventory of Chemicals and Chemical Substances): All components are listed on or exempt; **United States:** TSCA (Toxic Substances Control Act) Inventory: All components are listed on or exempt from listing under the TSCA.

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