

# CHASM Ag<sup>e</sup>NT™ VC102

## CNT Transparent Conductive Ink



### PRODUCT DESCRIPTION

CHASM-AGENT-VC102 is a solvent-based Carbon Nanotube (CNT) transparent conductive ink designed for screen printing on a wide range of plastic films.

### PRODUCT STRUCTURE

VC102 has three main components:

1. Best-in-class CNTs produced at CHASM
2. Acrylic binder to promote adhesion
3. Proprietary V2V™ (viscous-to-vapor) Ink Vehicle

### PRODUCT BENEFITS

- Good transparency & conductivity (tunable)
- Neutral color and low haze
- Environmentally stable
- Excellent adhesion to various substrates
- Flexible / foldable / formable
- Low temperature / rapid drying (110°C, 3 min)
- Affordable / excellent value

### PROCESSING

#### SCREEN PRINTING EQUIPMENT

- Screen Printing Equipment
- Semi-automatic or roll-to-roll flat-bed

#### SUBSTRATES

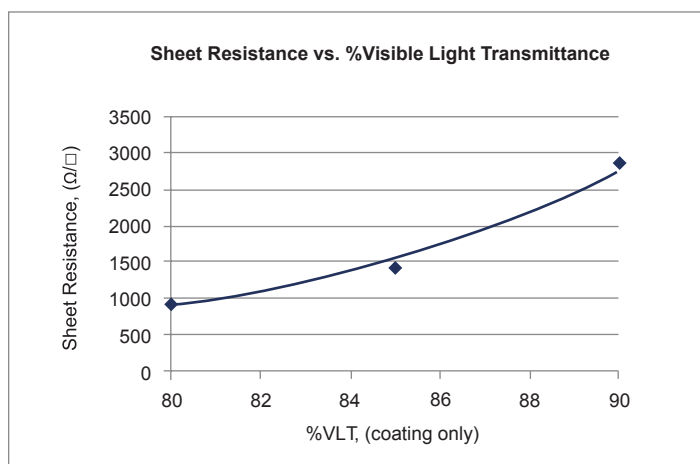
- Standard: PET, PC, Elastomer, Glass
- Other films can be tested at CHASM's Applications Development Center

### TYPICAL OPTOELECTRONIC PROPERTIES

Description	Properties
Sheet Resistance, ( $\Omega/\square$ )	1,500 +/- 200
Visible Light Transmittance, (%)	85% +/- 1
Haze, (%)	0.25
L*	89.99
a*	-0.51
b*	1.28
Adhesion Tape Test (3M Scotch Tape 600 on PC & PET)	No Transfer

Higher Transparency is possible by using VC007 Diluent. Lower Sheet Resistance is possible via two-print passes.

### SHEET RESISTANCE VS %VLT



### CONTACT INFORMATION

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### SCREENS

- Mesh Type: Polyester
- Mesh Count: 305 TPI (120 T/cm)
- Thread Diameter: 34  $\mu$ m
- Emulsion Type: Solvent Resistant
- Emulsion Over Mesh: 12  $\mu$ m Typical
- Mesh Bias: 22°
- Screen Tension: 20 N/cm (Stretch & Glue)

### PRINTING

- Squeegee Type: 70 durometers
- Squeegee Speed: 100 mm/s
- Floodbar Speed: 150 mm/s
- Operate press in flood / print mode. Only flood screen just before printing!
- Avoid adding excessive VC102 ink to the screen. Add fresh ink every 20-30 print images.
- Ventilation at the printer and infeed to the dryer is required to keep operator exposure well below alcohol and amine exposure limits.
- 100 FPM face velocity for hood can eliminate the need for respirator. If amine odor can be detected, increase ventilation.
- When blending VC102 and VC007, do NOT mix by hand. Blend in with paddle stirrer (low shear) for 10 minutes. Allow 30 minutes to de-bubble.

### DRYING

- Immediately after printing, parts should be placed in a conveyorized convection dryer (3 minutes @ 110°C is typical). Do not let wet films sit in a rack and do not use a batch oven.
- Printed sheets should ideally be placed on a clean film carrier to avoid non-uniform drying effects from the belt.
- Exhaust & make-up air for the dryer should be sufficient to keep the concentration of alcohol and amines below 25% of the lower flammability limit (LFL) in dryer and duct work. This can eliminate the need for explosion proof equipment.

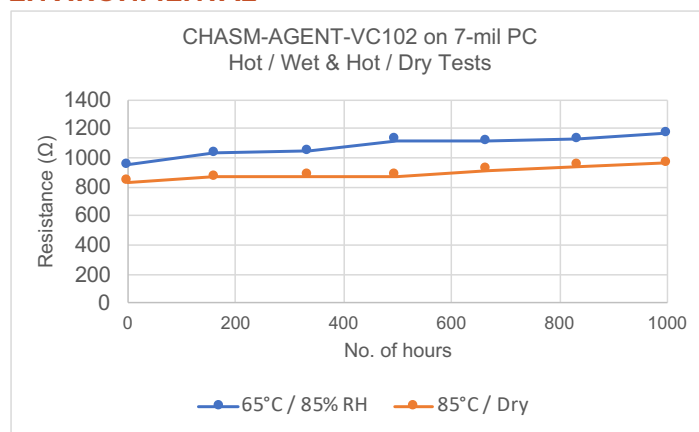
### CLEANUP

- Immediately after printing last part, VC102 can be added back to ink container, to be used later.
- Solvent for cleanup: Isopropyl Alcohol.
- VC102 contaminated cloths & wipes, when dry, should be disposed of as solid industrial waste.

### STORAGE & SHELF LIFE

- Ink should be stored in the shipped container from CHASM, tightly sealed. It is safe to store VC102 / VC007 at airconditioned 23°C.
- Shelf life of material in unopened containers is 12 months from the date of manufacture.

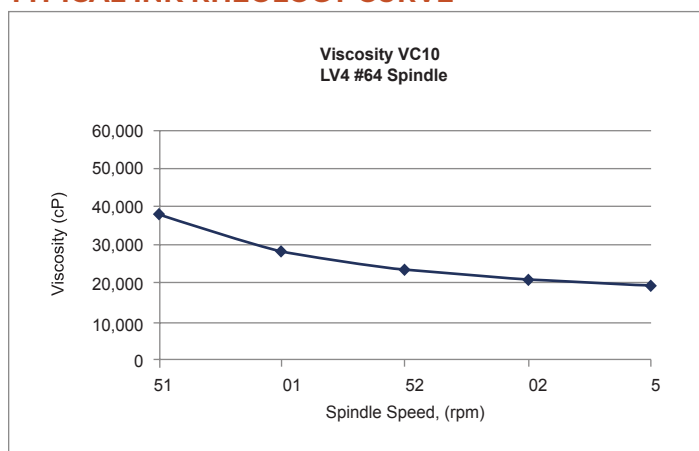
### ENVIRONMENTAL



### TYPICAL COMPOSITION PROPERTIES

Description	Properties
Physical Color	Black
Solids, ( % )	0.12
Viscosity, ( cP ) (Brookfield, 50 rpm, Spindle LV4-#64)	35,000
Theoretical Wet-film Thickness, ( $\mu$ m )	27
Theoretical Dry-film Thickness, ( nm )	33
Ink Consumption, ( ml/m <sup>2</sup> ) (Dependent on % coverage, @ 50% coverage)	13.5
Diluent (Please contact CHASM if required)	CHASM-SIGNIS-VC007

### TYPICAL INK RHEOLOGY CURVE



CHASM VC Series Inks are designed for screen-printing. The CNT ink starts off viscous, shear thins during the printing operation to flow through the screen mesh and then quickly rebuilds its viscosity to avoid ink bleed enabling 100nm lines/spaces.

FOR SAFETY AND HANDLING INFORMATION FOR THIS PRODUCT, PLEASE REFER TO THE SAFETY DATA SHEET (SDS).

#### DISCLAIMER

The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on CHASM's accumulated experience as of the date of publication. Product performance will vary based on application and operational environment, so CHASM Advanced Materials Inc. is not liable for the suitability of our product for the intended applications and results.

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