



## Silver-Filled Polyurethane Conductive Coating for EMI Shielding of Semiconductor Packages

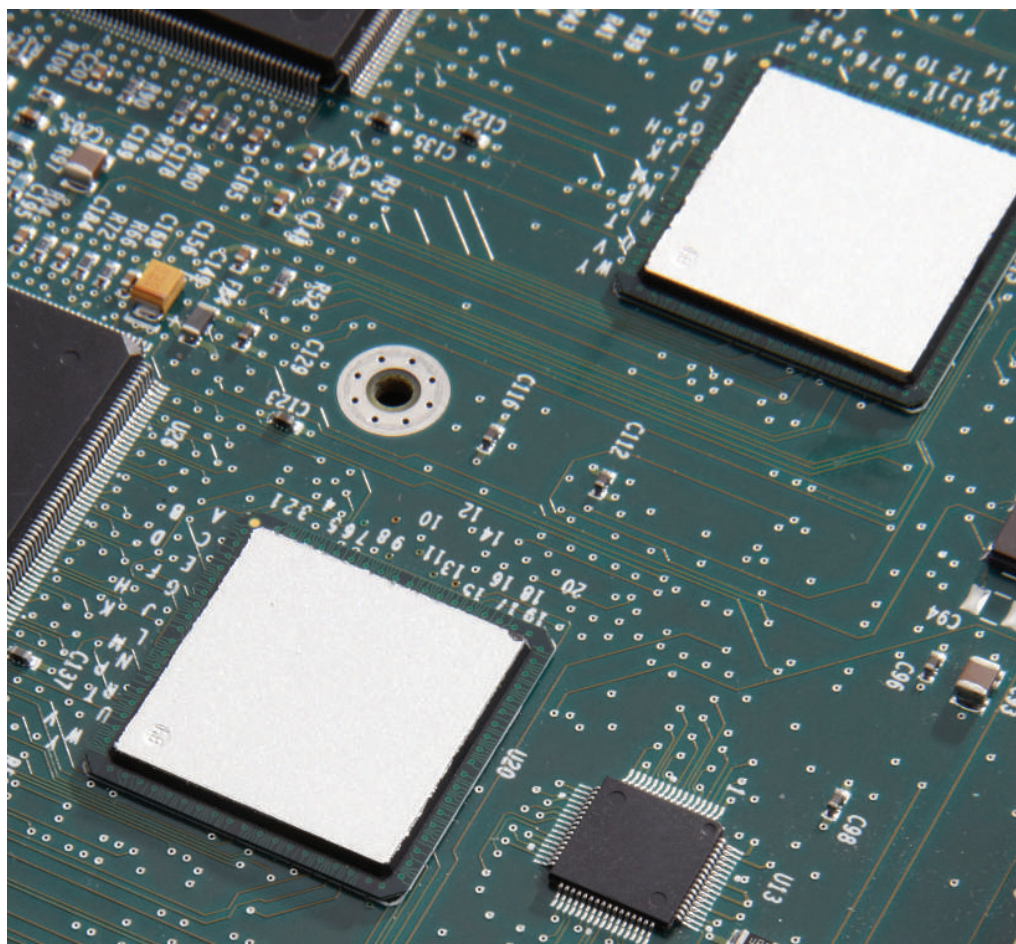
### CHO-SHIELD® 604

CHO-SHIELD® 604 is a highly conductive, advanced coating developed for high volume, precise spray applications on circuit boards and semiconductor packages. Combined with innovative technologies and packaging designs, CHO-SHIELD 604 can provide board level or package level EMI shielding of electrical components.

Applied correctly, CHO-SHIELD 604 can replace stamped metal cans, saving valuable board space and reducing the overall cost of board level EMI shielding. CHO-SHIELD 604's specially formulated flexible polymer system provides tenacious adhesion and good environmental stability.

#### Contact Information:

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#### Product Benefits:

- One component silver-filled polyurethane coating
- Designed for high volume spray application
- Flexible
- Excellent adhesive properties
- Withstands wave solder temperatures in excess of 500°F (262°C)
- Exceptional working life at room temperature. Cures only when heated, i.e., greater than 250°F (122°C)
- Environmentally stable
  - heat: 1000 hrs. at 150°C
  - humidity: 85% RH
  - thermal-cycling: 85°C/85% RH



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## Application

### Recommended Preparation

1. Clean the substrate: The substrate surface should be clean, dry and free of oils, release agents, dirt and lint.
2. Mix the material well by placing the can on a paint shaker for 3-4 minutes or mix by hand with a large spatula until all solids are in a homogeneous suspension. Check that no unmixed material remains on the bottom or the sides of the container.
3. Optional: Strain the material to reduce or eliminate the potential for clogging the spray nozzle. The paint can be strained through a coarse mesh (1000 micron) flat strainer into a pressure pot for spray. All metal fillers should be transferred, although a small amount of filler clusters might be collected in the strainer.
4. Optional thinning: Standard thinning can be accomplished with MEK (methyl ethyl ketone) solvent. During humid days (relative humidity >50% and temperature >85° F/30°C), use n-Butyl alcohol and add up to 8 fluid ounces per gallon of paint to eliminate blushing (a white tint on the drying surface).

### Fluid Delivery System

#### Low Volume Manufacturing- Spray

Use a standard air gun with approximately 20-50 psi (138-345 kPa) atomizing air. A fluid nozzle with an orifice diameter of 0.040 to 0.070 inch (1.016 to 1.778 mm) is recommended. To obtain maximum adhesion and conductivity, dry spraying should be avoided. Adjust the spray pressure to achieve a proper wet film. Siphon feed equipment can be used for small or prototype runs.

#### Moderate Volume Manufacturing- Spray Gun and Pressure Vessel with Agitation

Use a pressure pot (15 psi, 103 kPa, typical) with large diameter, paddle type agitator at low mixing speed to keep the metal fillers in uniform suspension. Conventional spray equipment such as HVLP (High Volume, Low Pressure) or DeVilbiss EGA 503 with propeller agitator pressure pots may be used for spray application with approximately 20-50 psi (138-345 kPa) atomizing air. Use lowest pressure possible. Re-circulation of the paint from the mixing pot through the spray gun and back via a pump delivery system is recommended for greater filler uniformity.

#### High Volume Manufacturing- Robotic Spray Systems

For large volume, precise spray applications, a robotic spray system with constant fluid recirculation should be used to keep conductive particles from separating and settling in the lines. Both ultrasonic and HVLP spray heads may be used to apply the conductive coating. Important factors to consider when determining spray head type are part geometry, masking requirements, overspray tolerance, paint transfer efficiency, and manufacturing cycle time. A fluid nozzle with an orifice diameter of 0.020 to 0.040 inch (0.508 to 1.016 mm) is recommended.

### Nominal Dry Film Thickness

A nominal dry film thickness of 0.001 inches (25 µm, 1 mils) is recommended to obtain > 70 dB shielding effectiveness from 80 MHz to 10 GHz. However, a thinner or thicker coat may be acceptable depending on the shielding requirements of the device being protected. Allow material to dry 10-20 minutes at room temperature between coats to avoid solvent entrapment.

### Drying Conditions

1. Dry at room temperature for 10-20 minutes.
2. Continue drying for 15 minutes at 302°F ± 5°F (150°C ± 2°C) for 0.001 inches (25 µm, 1 mils) thickness.

Dry longer if thicker film, shorter if thinner film, to achieve desired conductivity.

### Clean-up

The spray system, including spray gun, mixing pot, and containers can be cleaned with MEK or Acetone (VOC exempt solvent). Masks can be power washed with Challenge 485S barrier coat.

### Storage and Handling

CHO-SHIELD 604 should be stored at 50°F to 86°F (10°C to 30°C) and has a 9 month shelf life from the date of manufacturing in the original sealed container. CHO-SHIELD 604 is a flammable liquid. Please consult the material safety data sheet for proper handling procedures before use.

# Product Information

Typical Properties	CHO-SHIELD® 604 Typical Values
Polymer	Polyurethane
Filler	Silver
Shielding Effectiveness (CHO-TM-TP11)	Figure 1
Surface Resistance (max.) at 1 mil	0.010 ohms/square
Adhesion (ASTM D-3359)	5B
Average solids (weight)	30%
Viscosity (Zahn Cup No. 2)	22 seconds
Specific Gravity (ASTM D792)	1.3± 0.2 g/cc
Drying Time – Room Temperature Tack Free	1 hr.*
Recommended Cure Schedule 1	15 min. @ R.T. + 30 min. @ 125°C
Recommended Cure Schedule 2	15 min. @ R.T. + 15 min. @ 150°C
Continuous Use Temperature	85°C Max.
Shelf Life at 70°F (21°C)	9 months
Theoretical coverage	132 sq ft /gal /mil
Calculated VOC	767 g/L

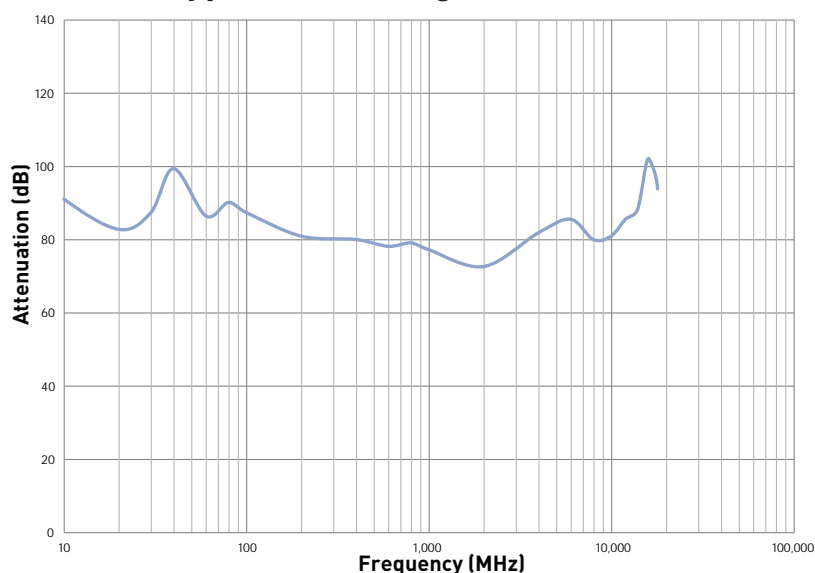
\*Requires heat cure to reach optimal electrical and mechanical properties of coating.

## Ordering Information

Product	Part Number	Unit Size
CHO-SHIELD® 604	52-04-0604-0000	1/2 pint

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

## CHO-SHIELD® 604 Typical Shielding Effectiveness Per CHO-TM-TP11



Supplied by:  
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