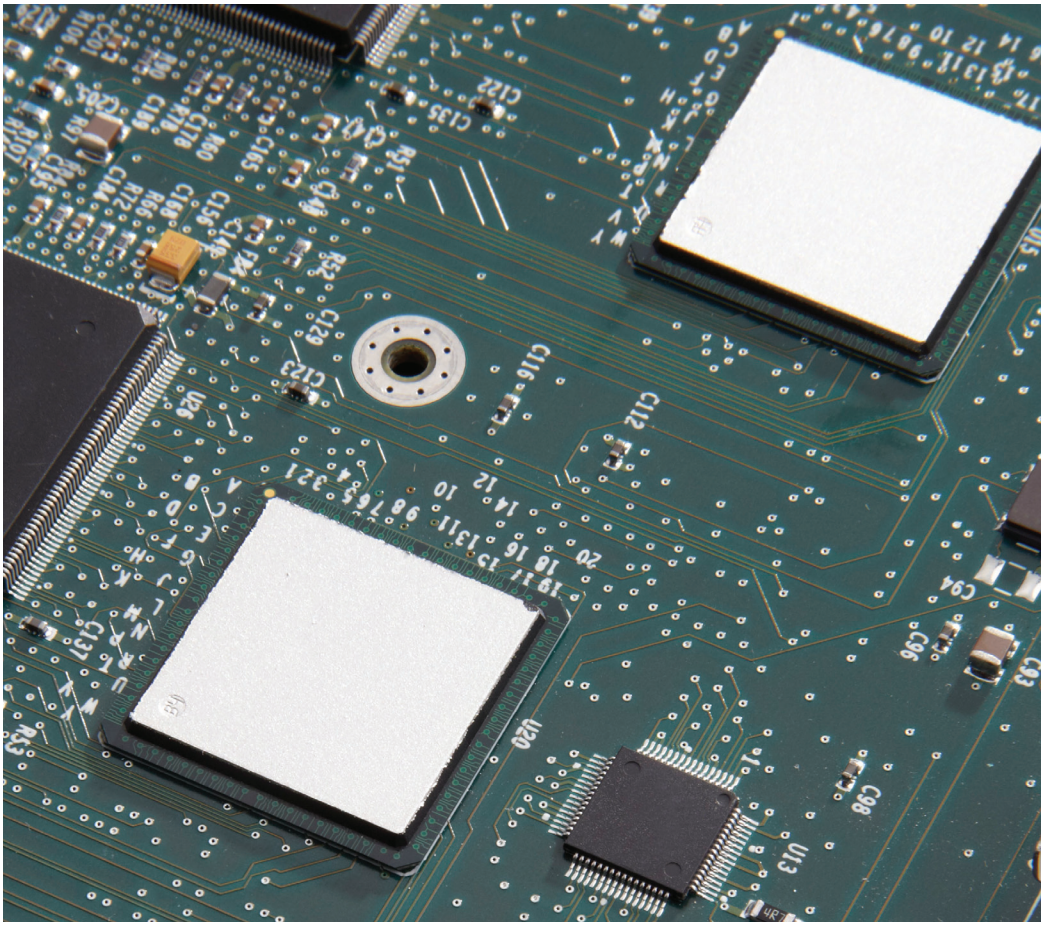
CHO-SHIELD® 604

HIGHLY ELECTRICALLY CONDUCTIVE SILVER POLYURETHANE EMI COATING FOR SEMICONDUCTOR PACKAGES

Customer Value Proposition:

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.



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Features and Benefits:

- One component
  - Designed for high volume spray application.
    Exceptional working life at room temperature. Cures only when heated, i.e., greater than 125°C (257°F).
- Silver flake filler
  - Excellent conductivity and EMI shielding of components.
- Polyurethane coating
  - Flexible coating which provides great adhesion to a variety of substrates.
    Environmentally stable, Heat [100 hrs @ 150°C (302°F)], Humidity 85% R.H.), Thermal-cycling [85°C (185°F)/85% R.H.]
    Withstands wave solder temperatures in excess of 262°C (500°F).

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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 course 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 >30°C/85°F), 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 HVLP spray gun with approximately 20-40 psi (138-276 kPa) atomizing air.

A fluid nozzle with a minimum orifice diameter of 0.040 (1.016) is recommended.

To obtain maximum adhesion and conductivity, dry spraying should be avoided. Adjust the spray pressure to achieve a proper wet film when applying the conductive coating.

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 use 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 70 MHz to 18 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 150°C ± 2°C (302°F ± 5°F) for 0.001 inches (25 µm, 1 mils) thickness.

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

Clean-up

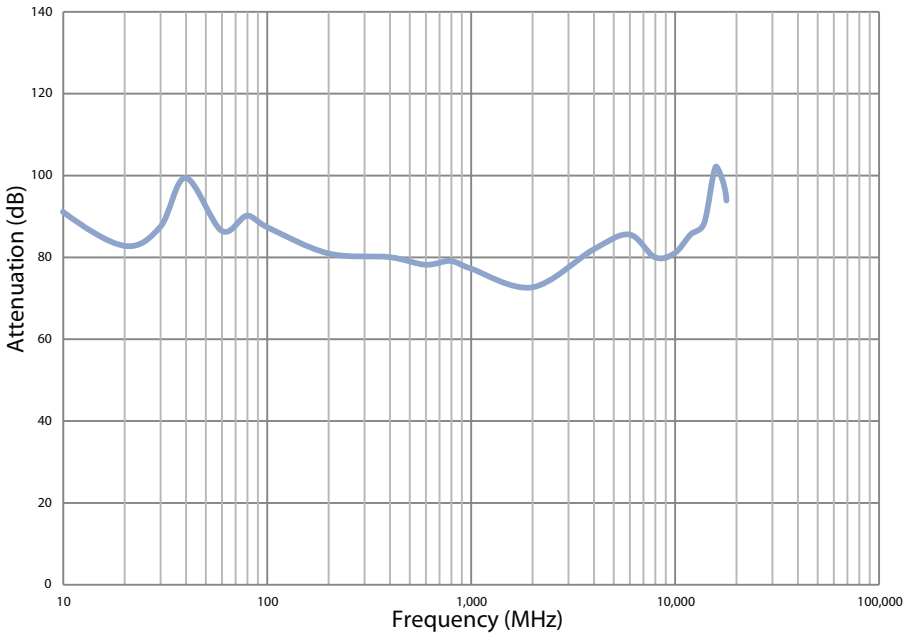
The spray system, including spray gun, mixing pot, and containers can be cleaned with MEK or Acetone (VOC exempt solvent). Masks can be power washed with Challenge 485S barrier coat.

Storage and Handling

CHO-SHIELD 604 should be stored at 10ºC to 30ºC (50ºF to 86ºF) 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.

Figure 1

CHO-SHIELD 604 Typical Shield Effectiveness PER CHO-TM-TP11*



* This test Method is available from Parker Chomerics.

CHO-SHIELD 604 - Product Information

Table 1 Typical Properties

CHO-SHIELD 604			
Typical Properties	**Typical Values**	**Test Method**	
Polymer	Polyurethane	N/A	
Filler	Silver	N/A	
Mix Ratio (A:B by weight)	1-part	N/A	
Color	Silver	N/A	(Q)
Spray Viscosity	19 to 25 seconds	Zahn Cup Number 2	(Q)
Surface Resistance (max.) at 0.001 inches (25 µm, 1 mil)	<= 0.010 ohms / square	CEPS-0002	(Q/C)
Shielding Effectiveness (see Figure 1)	>70 dB	CHO-TM-TP11*	(Q)
Recommended Dry Film Thickness	.001" (25 µm)	N/A	
Wet Density	1.2	ASTM D792	(Q/C)
Average solids (weight)	30%	Calculated	(Q)
Continuous Use Temperature	-40 to 125°C (-40 to 257°F)	N/A	(Q)
Pot Life	Unlimited	N/A	(Q)
Drying Time- Room Temperature Tack Free	None	N/A	(Q)
Drying Time- Room Temperature Full Dry	None	N/A	(Q)
Drying Time- Elevated Temperature Full Dry	**Cure Cycle Option 1:** 0.25 hr @ 21°C (70°F), followed by 0.25 hr @ 150°C (302°F) **Cure Cycle Option 2:** 0.25 hr @ 21°C (70°F), followed by 0.5 hr @ 125°C (257°F)	N/A	
Shelf Life at 21°C (70°F), unopened, from Date of Manufacture	9 months	N/A	(Q)
Calculated VOC	767g /L	Calculated	
Theoretical coverage at recommended dry film thickness	0.034 ft^2/gram 0.0032 m^2/gram 159 ft^2/gallon	N/A	

Notes: N/A – Not Applicable, (Q/C) - Qualification and Conformance Test, (Q) - Qualification Test, the above properties are based on Cure Cycle 1.
* This test Method is available from Parker Chomerics.

Ordering Information

Product	Weight (grams)	Packaging	Chomerics Part No.	Primer Included
CHO-SHIELD 604	290	10 fluid ounce aluminum bottle	52-01-0604-0000	Not Required

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.

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