



# SOS Safe-on-Substrate | Factsheet

## Mild Solvent Conductive Coating Technology Overview

Spraylat's SOS technology represents the current state-of-the-art in conductive paints. Based on advanced polymers and conductive media, SOS products have established a new level of performance at a much lower overall applied cost. Based on alcohol, rather than more harsh, aggressive solvents, these paints offer greater compatibility with many of the plastics used in the manufacture of today's electronic enclosures.

## 599 Series SOS Products Summary

The SOS line of conductive coatings includes three principal product types: Copper (silver-coated copper media), hybrid (silver-coated copper and silver media) and pure silver.

<b>599-B3755</b>	<b>Copper</b>
<b>599-B3740</b>	<b>Hybrid</b>
<b>559-B3730</b>	<b>Silver</b>

Selection of the "best" product for a given application ultimately involves achieving a balance between performance, cost and accommodation of individual product design. For conductive paints, copper products have the lowest material cost. As silver content increases, material costs also increase. To achieve the optimum balance between cost and performance, material cost is only a small part of the total cost. Part design and feature complexity, part size and the associated electrical requirements have a major impact on final product selection. Pure silver or hybrid products, for example, provide excellent electrical performance at a very low applied thickness, reducing the amount of overall material usage.

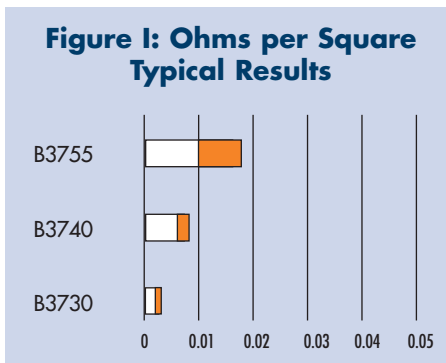
## SOS Performance Thickness

SOS technology offers some major advancements in reducing the thicknesses at which the products can be applied while maintaining excellent coating performance.

Typical Range of Film Thickness, $\mu\text{m}$	
<b>599-B3755</b>	<b>12.5-25.0</b>
<b>599-B3740</b>	<b>7.5-17.5</b>
<b>559-B3730</b>	<b>5.0-12.5</b>

## Electrical Performance

Electrical performance of conductive paints typically includes a reference to the ohms-per-square and point-to-point test methods. Figure I and Table I provide a summary of SOS product performance for each method. It is important to note that these performance levels are achieved with coating thicknesses which are very low. This helps drive total cost down.



While ohms per square values are indicative of coating conductivity at one particular spot, point-to-point testing is a measure of coating continuity across areas involving various features and geometries. Point-to-point testing is often incorporated into OEM specifications due to its value as a measure of electrical performance across critical areas in the enclosure design. Table I offers some representative results for each coating type on two differently configured mobile phone housings.

**Table I: Point-to-Point Representative Results**

milli ohms	Copper B3755		Hybrid B3740		Silver B3730	
	a-b	a-c	a-b	a-c	a-b	a-c
App. #1	.180	.200	.090	.120	.080	.100
	to	to	to	to	to	to
App. #2	.200	.240	.110	.140	.100	.120
	.100	.170	.110	.160	.100	.120
App. #2	to	to	to	to	to	to
	.130	.200	.130	.200	.120	.150

a-b = mid distance; a-c = corner to corner

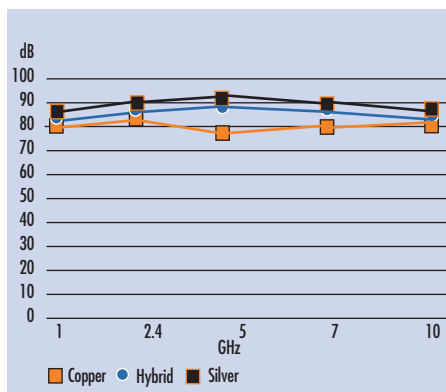
## EMI Shielding Properties

The shielding effectiveness of SOS products is excellent. In general, they provide comparable or better results than other conductive coating processes. Shielding effectiveness (SE) results in the ASTM D4935-89 Co-Axial Transmission Line Test and MIL STD 285 tests are shown in Figure II and Table II.

**Table II  
ASTM D4935-89  
Co-Axial Transmission Line Test**

MHz	Copper	Hybrid	Silver
	20 $\mu\text{m}$	15 $\mu\text{m}$	17.5 $\mu\text{m}$
30	90	74	90
50	88	74	92
100	85	78	92
300	78	73	78
500	80	72	78
700	79	72	78
1000	78	71	86
1500	77	71	86

**Figure II  
MIL STD 285 Test Results**



## SAR Protection

SAR (Specific Absorption Ratio) refers to an absorbed dose rate from radiating devices (or transmitters), such as cell phones. It takes into consideration the strength of the electric field, the distance from the transmitter as well as the mass and conductivity of the tissue receiving the radiation. In particular, a distance of less than 20 cm to the body, is of greatest concern and a focus of FCC, IEC and CENELEC standard. Limits are set in units of W/kg and referred to as maximum permissible exposure levels. Conductive paints have been found to provide excellent results when tested for SAR performance.

## Adhesion & Cohesion

The adhesion of conductive paints has traditionally been excellent to most plastics. SOS products have expanded on that process window, providing superior adhesion to various engineering plastics. SOS technology has brought important advancements in paint film properties. Particle “pick-off” problems associated with early generation conductive paint technology have been virtually eliminated. UL 746C ratings in the cross hatch adhesion test are readily met. Just as important, the durability and wear resistance of SOS coatings are excellent—many times better than their predecessors.

## Substrate Compatibility

As the name implies, SOS (Safe-on-Substrate) products are more compatible with the variety of plastics including those molded for thin-wall applications. Because they are alcohol-based and avoid more aggressive solvents, these products are compatible with today’s thin-wall moldings and are more tolerant to molded-in stresses.

## Typical Applications

Conductive paints are used for a variety of purposes as EMC solutions. These include: Electrostatic Discharge (ESD), electromagnetic shielding (EMI), SAR (specific absorption ratio) protection, ground plane and lightning strike protection. The following table provides some common EMC related applications for SOS conductive paint products. ■

### Telecom

- Mobile Phones, Pagers
- Networks, Fiber Optics
- Satellite Systems
- Antennas

### Business Equipment

- Desktops
- Laptops, Palmtops
- Mainframes

### Automotive

- Displays
- Control Modules
- Security, Navigation
- Entertainment Systems
- Power Equipment

### Consumer Products

- Toys, Games
- TVs and VCRs
- Cable Boxes, Receivers
- Home Security

### Instrumentation

- Test Equipment
- Analyzers

### Military, Aerospace

- Avionics
- Weapon Systems

### Industrial Controls

### Medical Equipment

- Monitors
- Analyzers

### Others

Rev. 5/13



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