

Application Note

Spray Coating for On-Chip Electromagnetic Interference Shielding

Application Description

Electromagnetic Interference (EMI) shielding for wireless devices is commonly achieved by using metal faraday cages, commonly called “cans” or “lids” that are soldered to a PCB board. These cans are bulky, difficult to rework, and become very challenging when several Radio Frequency (RF) chips are placed near each other. A solution to this is coating the chip packaging with metal as shown in Figure 1.

Depositing metal on the epoxy packaging by sputtering requires expensive vacuum equipment and is slow due to the nature of the vacuum process. An alternative approach is to use spray coating which is capable of greater throughput with much lower equipment costs.

Ink for EMI Spray Coating

Electroninks has developed a novel particle free ink that is cured at low temperature (100°C) with high conductivity (EI-1208). Some of the major product highlights are shown below:

Product Highlights (Ink EI-1208)

- Particle Free (precursor-based formulation)
- Low temperature curing 140°C
- High Conductivity 40% bulk silver
- Adhesion to epoxy molding compound
- >60 dB of shielding effectiveness has been demonstrated
- Cost effective compared to nanoparticle inks

Items Tested on Coated Chips

- Cosmetic appearance
- Barcode readability
- Adhesion
- Shielding Effectiveness

A chip coated with EI-1208 ink is shown in figure 1. The ink conformably coats the sidewall surfaces as shown by the example chip in Figure 2. The shielding effectiveness (S.E.) of the ink has been tested by Parker Chomerics (ASTM D4935) and shows minimum 60 dB of signal attenuation from 30MHz to 1500 MHz. Increasing the coating thickness past 3um should only increase the shielding effectiveness.

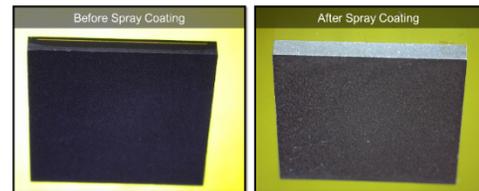


Figure 1: After coating 3um thickness of Electroninks EI-1208 by Spray Coating

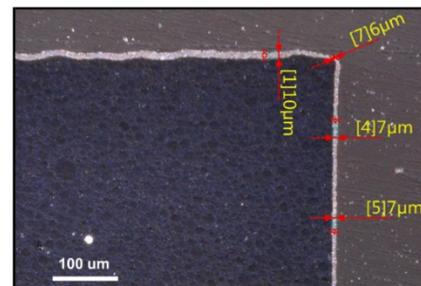


Figure 2: Microscope cross section image of coated chip.

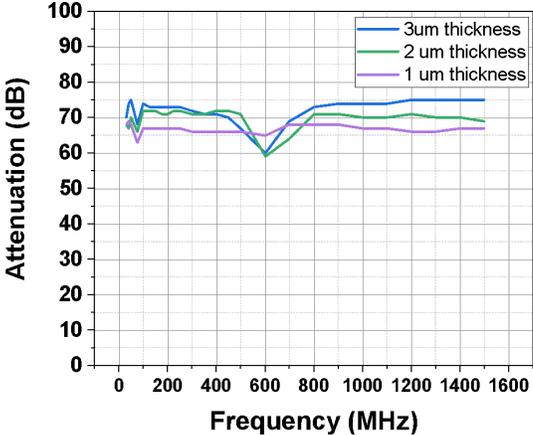


Figure 3: Shielding Effectiveness versus thickness of coating