Mobile electronic devices such as smartphones and tablets require highly-populated printed circuit boards (PCBs) to support their functionality and performance requirements in an ever-increasingly competitive market space. Consumers demand faster processing speeds, high resolution pictures, and a longer battery life all within the palm of their hand.

To deliver advanced functionality and performance, board and semiconductor package designers must become Tetris experts - working together to tightly pack semiconductor devices on PCBs in the most efficient ways possible without causing EMI issues. Mobile electronic device OEMs have no tolerance for EMI issues since performance and reliability drive consumer demand in this market.

To eliminate potential EMI issues caused by densely-populated PCBs, PCB and semiconductor designers are investigating novel new ways of shielding semiconductor devices and printed circuit boards. Traditional metal EMI shields are no longer an option, as they take up too much board space and therefore reduce the overall competitive functionality of the mobile electronic device.

One possible solution is an integrated EMI shield: a semiconductor device which has an electrically conductive layer applied over the top and sides of the semiconductor package, which grounds the device to the printed circuit board internally.

Integrating the EMI shield into the semiconductor package this way has two main advantages: 1) it saves PCB space by incorporating the EMI shield into the semiconductor device itself, increasing the mobile electronic device’s functionality and reducing the overall size of the final product, and 2) it simplifies the board design, reducing product cycles, and helping OEMs realize revenue sooner.

The two most common ways to create an integrated EMI shield are applying a metallization layer using some form of physical vapor deposition (PVD) or spraying an electrically conductive organic coating directly on the semiconductor package. Both technologies provide effective EMI shields, reduce the PCB footprint of the semiconductor device, and simplify PCB designs, the difference is in the overall cost of the EMI shielding solution. Using a PVD process to create an integrated EMI shield can be a high risk and costly proposition. PVD requires a significant up front capital equipment investment and, since it requires a vacuum step and is a batch process, can lead to a higher overall cost/integrated EMI shield.

In contrast, Chomerics’ advanced conductive organic coatings can be applied to semiconductor devices with minimal capital equipment investment in a continuous high volume application process. By applying a conductive organic coating in a continuous high volume application process, semiconductor manufacturers can minimize their risk and achieve the lowest overall cost/integrated EMI shield. Furthermore, conductive organic coatings are more flexible than typical metallized PVD coatings, resulting in a decrease in adhesion issues following environmental exposure. (The last thing an OEM wants from a semiconductor package with an integrated EMI shield is another possible failure mode for his/her mobile electronic device.)
Another approach to tackling EMI issues at the package or board level in electronic mobile devices is by applying an organic absorber coating to the semiconductor package or PCB to absorb extraneous electromagnetic waves.

Chomerics’ absorber coatings are formulated to absorb electromagnetic waves at customer specific frequencies, and because they are non-conductive - can be applied directly to PCBs already populated with semiconductor packages. These absorber coatings can be applied to the PCBs or sections of the PCBs to reduce unwanted EMI noise after board assembly.

The main advantages of using absorber coatings to address EMI issues are: 1) they are non-conductive and don’t need to be electrically grounded to the PCB, simplifying or eliminating masking; 2) they can address EMI issues on the PCB, in-between tightly packed semiconductor devices; 3) they can be tuned to absorb EMI at customer specific frequencies; and 4) they can be applied at the end of a product design cycle to solve EMI issues without having to go through another re-design cycle.

Like Chomerics’ conductive EMI shielding coatings, Chomerics’ absorber coatings can be applied in a continuous high volume manufacturing environment with minimal capital equipment investment, making them a low cost, low risk solution for board or component level EMI issues.

The challenges of suppressing board level EMI are not going away. On the contrary, as consumers continue to demand more and more functionality from their mobile electronic devices, OEMs must continue to find novel approaches to solve these ever growing board level EMI issues without impacting product design cycles and manufacturing costs.

By partnering with material and EMI testing experts such as Parker Chomerics, mobile electronic device OEMs and semiconductor manufacturers can continue to develop and leverage the use of the advanced materials and technologies necessary to address present and future EMI issues, in a timely and cost effective manner.