

# REDUCING ELECTROMAGNETIC INTERFERENCE IN EV APPLICATIONS

When you think about an electric vehicle, thermal management and cooling the vehicle are the first things that come to mind, however, you should also be considering shielding and grounding materials as well. There are a number of sources of potential electromagnetic interference, or EMI, in an electric vehicle.

The primary source of EMI in an electric vehicle is from the power converter. The power converter systems use high speed switching devices to work at high frequencies over a wide frequency range generating harmonics which is the source of EMI.

As with the power converter, the electric motors are required to operate at high power levels potentially unrestricting EMI through electromagnetic emissions, or EME, via impedance which changes as a function of frequency. As an EV motor drives, it uses power inverters with high-speed switching operation causing surge voltages to occur at the terminals, which can cause EM noise.

The currents in traction batteries and the interconnectors become a source of electric and magnetic field emission, or EMF, creating an opportunity for the electromagnetic interference.

Shielded and unshielded cables that carry high levels of current between the subsystems of the electric vehicle create very strong magnetic fields. This is caused by high and low voltage cables being placed in close proximity due to space limitations resulting in EMI.

Batteries and charging present major external EMI sources. Wireless charging sites and battery chargers create extremely strong magnetic fields to transfer power to the electric vehicle.

With the advancements in automotive technology, the vehicles of today are jam packed with electronic components and systems. While having navigation and entertainment at our fingertips is convenient, all of those electronic subsystems in a confined space can lead to significant sources of EMI that can potentially cause those systems to malfunction or fail to operate altogether. Using the correct EMI material solutions is extremely important in all aspects of EV design.

