SYNERGIES SHOWCASE

Delivering Critical Three-Way Protection for Sensitive Medical Electronics

Collaboration Between DuPont Films & Laminates, Laird Performance Materials Helps Ensure Reliability

CASE STUDY

THE ISSUE

Sometimes electronic designs essentially function to improve upon earlier versions. At other critical times, they help save lives.



Heart attack victim

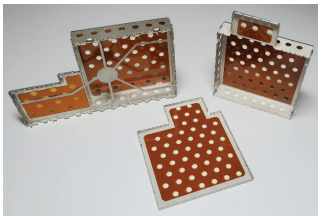
One example is automated external defibrillators (AEDs), the emergency medical devices which must perform flawlessly despite a wide range of operating conditions and locations. They are found from hospitals, public libraries, emergency vehicles, nursing homes, and busy street corners to offices, production plants, airports, churches, and school gymnasiums.

Safeguarding an AED's fragile electronics comes with daunting design challenges. A variety of safeguards must be built into an AED to better ensure that device users – for example the responders aboard emergency vehicles – can rely upon their unit to work perfectly to help revive heart attack victims. Unresponsiveness? Unpredictable performance? Overheating? Possible complete failure? None of these are acceptable when lives hang in the balance.



Wall mounted defibrillator

For instance, a potential performance trouble spot is a defibrillator's PCB-level power module. The issue for one U.S.-based AED manufacturer focused on power module components that were experiencing rising heat loads and radiating emissions in the form of electromagnetic interference (EMI). Both can degrade performance. Another hurdle related to actual AED operating conditions needed to be addressed as well: the rough-and-tumble work environment itself. Any threat can lead to system failure. Reliability is imperative.



Kapton® and Laird combined design

RESOLUTION

Following innovative design modifications, the AED manufacturer now uses a basic part design to provide protective measures for power supply module components. The design helps simultaneously address heat, EMI, vibration, shock, and potential severe damage from accidental drops. The solution emerges from a part design collaboration between DuPont Interconnect Solutions' Films & Laminates business and Laird Performance Materials, which DuPont acquired in 2021.

To significantly reduce defibrillator power supply EMI and lessen damage caused by drops, the manufacturer has turned to Laird™ lead-free, RoHS-compliant metal shields designed by Laird's facility in Schaumburg, Illinois. Protecting the power supply module's circuitry from extreme heat and cold, shock, and potentially severe drop damage is DuPont™ Kapton® polyimide film, adhered to the underside of the Laird shields. Similar ultra-thin layers of Kapton® are shielding the James Webb space telescope from the sun's heat and helping ensure continued transmission of spectacular photos of the universe.

To satisfy durability concerns and be approved for sale, the AED needed to meet the one-meter, IEC 60601-1 Ed 3.2 Clause 15.3.4 drop test standard. The power module package met the drop test successfully. Moreover, the parts arrive at manufacturing sites ready to be installed, thus avoiding extra assembly requirements.

RESULTS

The design modifications enable the AED to meet stringent medical device EMI shielding and heat dissipation requirements, along with serving to help guard against potential damage.

According to Jason Galinski, DuPont Global Merger & Acquisition Integration Leader, combining the talents of two organizations to satisfy the AED manufacturer's needs "continues to produce new opportunities to innovate, to serve the medical field more directly at the patient level and to ensure DuPont is taking steps to improve the overall reliability of critical, life-saving devices. The defibrillator project goes straight to the heart of improving emergency care."

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