

Everything-Proof: The Future of Mobile and Wearable Devices

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Consumers' growing dependence on mobile devices now extends well beyond the communications realm and into health, fitness, entertainment, transportation and more. With this reliance on smartphones, fitness bands and connected watches also comes huge expectations: expectations for reliability, expectations for enormous functionality, expectations for exceptional design and, yes, expectations for extreme durability.



In the early days of smartphones, users were generally happy if they could drop their phone with little consequence. The ability to cope with an occasional spill of a common beverage or sweat during those 6 a.m. workouts was also a nice-to-have. As reliability and environmental durability incrementally improved, so, too, did consumer demands. The quest for more features in shrinking dimensions continues to place huge pressure on thermal management, protection of exceptionally small and delicate components, EMI capability and reliable interconnects. Remarkably, many of these challenges have already been addressed. High-performance, re-workable underfills, capable thermal materials in pad, film and

liquid formats, unique package-level EMI alternatives and game-changing solder pastes have, indeed, enabled the smallness, performance and reliability of today's mobile devices.

Now what? Top on the wish list has to be waterproof durability. Water resistance is something consumers have longed for and considered by some as a virtual smartphone utopia. As most smartphone owners have probably experienced the unfortunate result of a wet mobile phone, the idea that this could someday be avoidable is enticing. To be sure, leading smartphone manufacturers have already made moves in this direction, as evidenced by recent promotions of the sort. However, reaching true waterproof status for the entire phone, watch or fitness band is a tall order but one where significant progress is being made. The product design and material selection considerations for ensuring water resistance are immense and extend from the PCB, where conformal coatings play an important role, to sealants for camera modules and, yes, even elimination of external jacks and connector ports.

As a leading provider of adhesive solutions for camera module assembly, Henkel has developed a full suite of materials that enable advanced camera module technology – from lens bonding to attachment of the lens holder to the substrate to voice coil motor bonding and everything in between. Now, in a

new breakthrough, Henkel has developed a waterproof sealing adhesive for camera module lens bonding – yet another milestone on the path to fully waterproofed smartphones. LOCTITE ECCOBOND LS 3106P is an optically clear adhesive that effectively seals all of the lenses within a lens house bonding for both auto focus and fixed focus lenses, protecting the optical components against damage from water.

The new adhesive has a low thixotropic index, making it ideal for filling the small gaps present in a lens assembly. This material characteristic allows LOCTITE ECCOBOND LS 3106P to flow easily without added pressure and provides excellent coverage for complete self-sealing. What's more, the thixotropic index of LOCTITE ECCOBOND LS 3106P shows very little change over time with similar performance at 30 days and 90 days. A long pot life allows manufacturers to minimize waste, as the adhesive can cope with continuous use for up to 60 days with no material degradation. In addition to these benefits, LOCTITE ECCOBOND LS 3106P has exceptionally low weight loss, indicating minimal outgassing for robust performance. The lens module's operation is dependent upon the optical lenses, so any outgassing during the cure process could fog the lens and affect the performance of the camera. Henkel's waterproof sealant remains stable during UV curing without any outgassing, ensuring predictable lens operation. LOCTITE ECCOBOND LS 3106P also exhibits very low shrinkage, which is critical for fragile, thin lenses and alignment accuracy as shrinking of the material post-cure can result in shifting alignment or impaired lenses. With no change in linear shrinkage post-cure, LOCTITE ECCOBOND LS 3106P protects against lens misalignment and/or damage.

While all of these material properties are critically important, LOCTITE ECCOBOND LS 3106P's primary function is waterproofing and here, too, the adhesive delivers. In waterproof simulation testing, LOCTITE ECCOBOND LS 3106P survived complete water submergence. The test vehicle was sealed with the adhesive and submerged in water for 24 hours at room temperature, following which it was exposed to an 85°C/ 80% relative humidity (RH) environment. The material showed no water leakage or swelling following the 24 hour submergence or the 85° C/85% RH exposure.

Henkel's LOCTITE ECCOBOND LS 3106P is one of many elements required for the waterproofed smartphones and wearables of the modern era. With success already proven with newer-generation devices, LOCTITE ECCOBOND LS 3106P is helping to facilitate the future of mobile durability.

To find out more, visit www.henkel-adhesives.com/electronics.